ONTARIO FIELD CROPS
RESEARCH AND SERVICES COMMITTEE

2001 ANNUAL REPORT
TO

ONTARIO AGRICULTURAL SERVICES

COORDINATING COMMITTEE

February 1, 2002

ONTARIO FIELD CROPS RESEARCH AND SERVICES COMMITTEE

2001 Report

Editors: Gary Ablett, Clarence Swanton, Peter Johnson, Rob Templeman, Brian Hall, John Madill, Hussein Haji, Greg Stewart, Art Schaafsma, Francois Tardif

Table of Contents

Page #

Table of Contents .....

Executive Summary 3

Introduction 4

Mandate of Committee 7

Industry Sector Scan 9

Strategic Directions 36

Appendix 64

1. Report on Tobacco Research Priorities 64
2. Committee Memberships 67

Executive Summary

The Field Crop sector is a dynamic industry that continues to evolve and change. Cropping patterns are changing in demand to economic pressures, new technologies are being introduced and adopted rapidly and the producer (industry) is shifting more focus to consumers as their primary customers.

The role of the Ontario Field Crops Research & Services Committee and it's eight constituent subcommittees, set against that background of change, is to recommend strategic research and service directions to improve the efficiency of crop production in Ontario and to improve the competitiveness of, and opportunities for, Ontario agriculture in world markets. The major role that industry plays on these committees is essential in this process.

The 2002 Report establishes new strategic directions for the field crop sector. Research and service priorities encompass 5 broad themes which are: life sciences, food quality and safety, environmental sustainability, rural economic development and competitiveness. All priorities whether specific to commodities or disciplines address one or more of these themes. Specific research priorities and service issues are grouped under the following headings:

Research Priorities

1. Agronomic Systems and Environmental Stewardship

Research leading to production systems and their components which enhance competitiveness, food quality and safety and environmental sustainability.

2. Innovative and enhanced germplasm development and utilization.

This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.

3. Market Responsiveness

Research strategies to address market development, new product development, food safety and enhancement.

Service Priorities:

1. Efficient and effective technology transfer

Development and implementation of strategies to ensure the verification and uptake of appropriate technological advancements by the field crop sector.

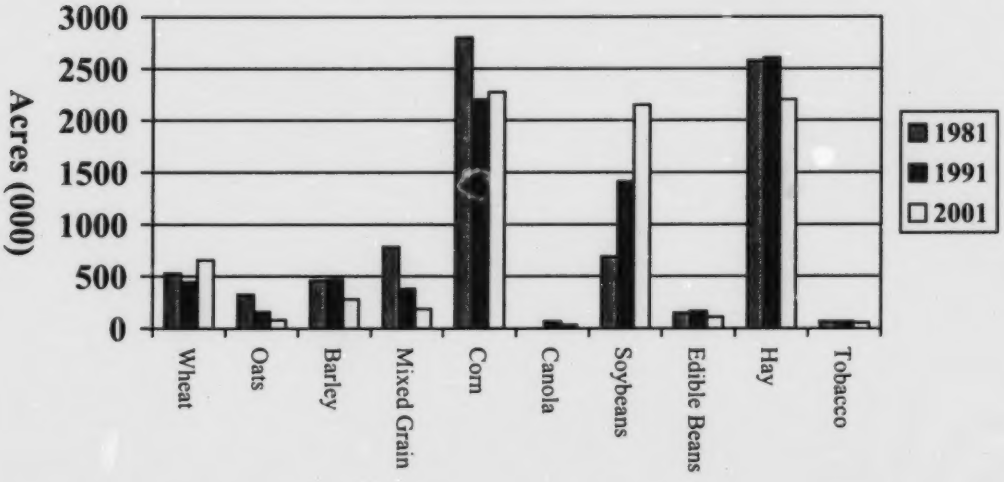
These core areas are detailed in the section on Strategic Directions where specific research/service recommendations are chronicled. These recommendations represent the areas of research and technology transfer that FCRSC considers essential to the strengthening of the field crop industry in Ontario. Within each core area are commodity and pest management specific priorities. Activity is documented in each area, and rate of progress, industry needs and potential for success should dictate the shifting of resources within and across these priorities.

Introduction

The 2001 Report of the Ontario Field Crops Research and Services Committee provides an overview of the status of field crop sector in Ontario including the identification of current issues facing the industry and the strategic directions and priorities for research and service.

As in previous years, low commodity prices and the uncertainty of a stable safety net program are issues of considerable significance to the field crop sector. The unprecendented drought in Ontario in 2001 manifested into huge economic losses for many producers driven in large part by soybeans where the combination of drought, heat, soybean aphids and some cold nights combined to reduce yield to pre-1940 levels, about 50% of normal. In addition, the visual quality of the crop was very poor with shrivelled seed, insect damage and lower test weight. This reduction was so remarkably severe that it will impact the industry for years to come. Crop Insurance payouts are huge, the impact on export markets is very significant. Export companies continue to work dilegently to meet export contracts and maintain customer satisfaction. Still the repersuccions of this drought will felt for years to come and will at the very least shift some soybean acreage to other crops in 2002, most notably corn. Although the attention of the grains and oilseed sector focused on soybeans, the impact of the drought caused an impact in most field crops either through yield or quality reductions or both.

Fig. 1 Field Crop Trends 1981-2001



Over the last twenty years, acreage of field crops in Ontario has shifted (Fig. 1) to accommodate a substantial increase in soybean acreage and concomitant reduction in small grains, specifically oats, barley and mixed grain. Although a reduction in barley acreage is clear when compared to 1991 levels, acreage actually increased substantially in 2001 relative to 2000. Further, two key events which took place in 2001 may positively affect the small grains crop in Ontario in future years. The first event was the formation of the Oat and Barley Council, while the second was the re-opening and expansion of the Quaker Oat plant in Peterborough. Both are seen as positive for the sector. Wheat acreage has remained reasonably steady, however, over the last ten years there has been a significant shift in wheat types. From

a crop that was essentially all soft-white winter wheat previous to 1990, it is now approximately 40% soft-red, 40% soft-white and 20% non-pastry red. That trend is likely to continue over the next few years. Overall, edible bean production also appears to be relatively steady, however, significant changes are occurring in that sector as well. White bean acreage has declined by 60% over the last ten years, while coloured bean production has increased over two-fold in this same period. A new organization, Pulse Canada, has emerged and is being positioned to serve a co-ordinating and leadership role for pulse research in Canada. Forage production continues to be a significant component of agricultural production in Ontario. They are grown on 65% of the farms in Ontario, cover 28% of the field crop land area and provide the nutrient base to the livestock sector.

Major Field Crops
Relative Farm Gate Value - 2000

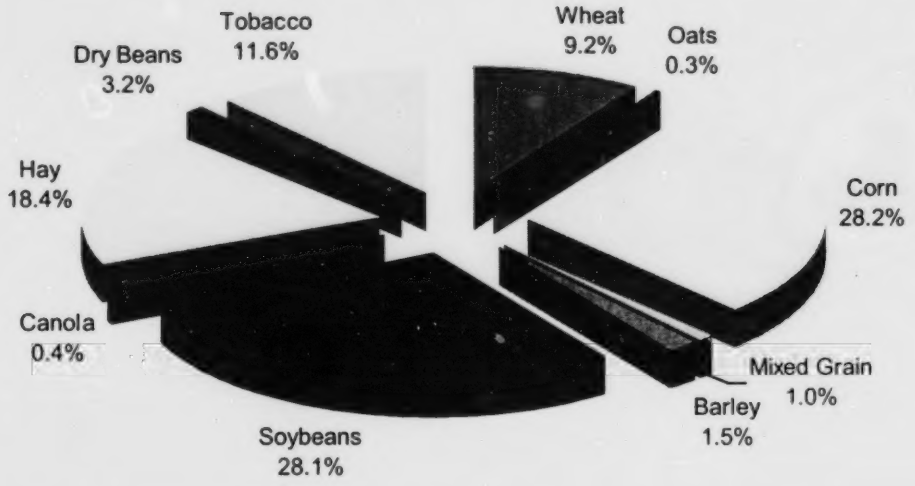


Table 1. Estimated Area, Production and Farm Value of Specified Field Crops, Ontario, 1999, 2000 and 2001.

Crop	Year	Units	Area June 1 (a) (acres)	Area For Harvest (acres)	Production Yield (units/acre)	Production Total ('000 units)	Farm Value Per Unit ($)	Farm Value Total ($'000)
Winter Wheat	1999	bu	710,000	710,000	73.2	52,000	2.98	155,000
	2000	bu	680,000	680,000	74.3	50,500	3.53	178,300
	2001	bu	540,000	540,000		71.9 38,800	--	--
Spring Wheat	1999	bu	75,000	75,000	45.3	3,400	4.08	13,870
	2000	bu	85,000	82,000	46.3	3,800	4.94	18,800
	2001	bu	115,000	115,000	53.0	6,100	--	--
Fall Rye	1999	bu	70,000	60,000	41.7	2,500	1.90	4,750
	2000	bu	80,000	60,000	40.0	2,400	2.67	6,400
	2001	bu	70,000	60,000	35.8	2,150	--	--
Buckwheat	1999	bu	7,000	6,000	23.3	140	6.68	935
	2000	bu	7,000	5,000	26.0	130	6.21	800
	2001	bu	5,000	4,000	35.0	140	--	--
Oats	1999	bu	105,000	95,000	65.3	6,200	1.72	10,660
	2000	bu	90,000	70,000	61.4	4,300	1.73	7,400
	2001	bu	80,000	70,000	68.6	4,800	--	--
Barley	1999	bu	300,000	285,000	63.5	18,100	2.09	37,800
	2000	bu	250,000	230,000	57.4	13,200	2.49	32,900
	2001	bu	280,000	270,000	65.9	17,800	--	--
Mixed Grain	1999	bu	250,000	235,000	65.1	15,300	1.65	25,200
	2000	bu	200,000	175,000	66.3	11,600	1.84	21,300
	2001	bu	190,000	170,000	67.6	11,500	--	--
Grain Corn	1999	bu	1,825,000	1,800,000	128.3	231,000	2.84	656,000
	2000	bu	1,730,000	1,680,000	105.1	176,500	2.93	517,100
	2001	bu	1,950,000	1,920,000	103.1	198,000	--	
Canola	1999	bu	75,000	70,000	34.3	2,400	6.06	14,540
	2000	bu	40,000	38,000	36.3	1,380	5.53	7,600
	2001	bu	35,000	35,000	39.4	1,380	--	--
Soybeans	1999	bu	2,125,000	2,125,000	40.5	86,000	7.17	617,000
	2000	bu	2,250,000	2,235,000	38.0	85,000	7.07	601,000
	2001	bu	2,150,000	2,130,000	21.1	45,000	--	--
Dry White Beans	1999	cwt	85,000	85,000	17.4	1,480	25.52	37,770
	2000	cwt	55,000	53,000	13.3	705	22.91	16,200
	2001	cwt	55,000	50,000	13.0	655	--	--
Coloured Beans	1999	cwt	50,000	50,000	17.0	850	..	..
	2000	cwt	50,000	46,000	11.5	530	..	..
	2001	cwt	55,000	50,000	10.0	500	--	--
Fodder Corn	1999	tons	300,000	300,000	15.3	4,600	22.00	101,200
	2000	tons	320,000	318,000	12.3	3,900	21.80	85,000
	2001	tons	320,000	310,000	10.6	3,300	--	--
Hay (b)	1999	tons	2,300,000	2,190,000	2.3	5,100	87.13	444,350
	2000	tons	2,300,000	2,240,000	2.4	5,400	72.88	393,600
	2001	tons	2,200,000	2,110,000	2.1	4,400	--	--
Tobacco, flue-cured	1999	lbs	59,500	59,500	2,392.9	142,379	2.17	308,933
	2000	lbs	55,000	55,000	1,934.9	106,422	2.32	246,900
	2001	lbs						

Source: OMAFRA Statistics

The identity-preserved market is shifting in Ontario particularly in soybeans. Acreage and value of contract production and I.P. production is increasing while that of special quality white hilum production (no specific cultivar) is decreasing. This trend will likely continue particularly with the potential introduction of white hilum Round-Up Ready soybean cultivars in Ontario in the near future. Soybeans tend to lead the way in the I.P. market with the production of specific tofu/natto varieties, special quality white hilum varieties, organic production and even non-GMO production. These opportunities are also increasing in other crops. As examples, premiums for cracker quality wheats, food-grade corn, and new coloured bean types have increased. In addition new markets are opening and expanding for our commodities, such as increasing industrial demand for corn (ethanol, citric acid, biochemicals).

The total farm cash receipts in 2000 for Canada was approximately $ 32.97 billion across all sectors. Ontario's share of those cash receipts was 23.9% or 7.89 billion. The farm cash receipts from the Field Crop sector in Ontario are approximately $ 2.2 billion. This is in comparison to dairy at $ 1.30 billion, other livestock at 2.66 billion, all commercial fruit crops of approximately $ 0.21 billion, vegetables (excluding potatoes) at $ 0.49 billion , mushrooms at $ 0.12 billion and greenhouse crops of $ 0.30 billion.

Ontario field crops are a source of major exports, with approximately 75% of the white bean crop, 15% of the soybean crop and 12% of the corn crop being exported annually, although Ontario continues to be a net importer of corn. In order to maintain the viability of agriculture in Ontario, the efficiency of production, the quality, safety and marketability of all field crops need to continually improve, both to enhance domestic markets and to compete globally. These are the primary goals of agricultural research.

Mandate of Field Crops Research and Services Committee:

The Ontario Field Crops Research and Services Committee and its constituent subcommittees are empowered to review and direct research and services leading to the improvement in crop production efficiencies and competitiveness of Ontario agriculture in world markets. Specifically the mandate of the committee is:

(a) To review reports submitted by Commodity and Pest Management-based subcommittees.

(b) To assess requirements for Field Crop Research and Services

(c) To establish priorities for Field Crop Research and Service programs

(d) To assess progress in Field Crop Research

(e) To develop and present reports and recommendations to the Ontario Agricultural Services Coordinating Committee describing the needs for Field Crop Research and Services including as appropriate information in relation to:

(i) cost-benefit
(ii) research facilities and personnel required
(iii) location best suited for the investigation
(iv) how funds might be obtained or freed to conduct new research or services
(v) operation of crop committees

(f) To consider and approve Chairs and membership of each Crop Committee

(g) To appoint representatives to other OASCC Research and Services Committees when requested and to liaise with the Ontario Pest Management Research and Services Committee.

(h) To provide an inventory of the research effort in field crops

(i) To take a lead role in the documentation of Research Accomplishments and Proposed New Research Directions for ARIO program reviews on a 4-year basis.

Industry/Sector Scan

Cereals

State of the Industry

For the third consecutive year, excellent yields were harvested from the Ontario winter wheat crop. Average yield for the wheat crop was 73.5 bu/ac, despite relatively late planting in the fall of 2000. The total crop is estimated at 1,150,000 tonnes.

Of the 650,000 acres initially planted, approximately 100,000 acres were destroyed by snow mould and winter injury with snow that came on Dec 1st and stayed until mid-March. Snow mould has not been a significant problem since the late 1970's. Seed treatments proved their worth in reducing damage from this disease, with bin run, untreated seed showing far more damage than certified seed.

Growth of red wheat continues, with soft red tonnage exceeding soft white tonnage for the first time this year, and continued growth in the non-pastry red wheat category. Current breakout of market classes is 40% soft red, 40% soft white, and 20 % non-pastry red.

Again in 2001 the wheat crop narrowly escaped severe problems with fusarium. Almost all samples of wheat received by the Canadian Grain Commission had fusarium present, yet only about 5000 tonnes were downgraded to feed due to fusarium. While visual quality and grade were good, DON levels in grain samples with minimal fusarium counts were higher than anticipated. This caused difficulty in meeting market requirements of the cereal and baby food industry, with growers being frustrated as premium markets vanished and grain suppliers having difficulty in supplying these markets.

A co-operative effort between AAFC and Hyland Seeds holds promise for development of fusarium tolerant (MT), and perhaps even resistant, wheat varieties for Ontario. The first of these varieties will be put forward for registration January 2002. Pioneer has varieties with improved levels of tolerance (MS to MT) in the testing system.

Folicur received emergency registration for the second year, and was applied on 40 to 50,000 acres of wheat. The shortcomings of the fusarium prediction model became painfully evident, as prediction maps changed from red to green overnight with missed rainfall events and changing weather forecasts. Growers remain frustrated and confused with these extreme changes due to weather impacts on model predictions, yet remain hopeful that it can become an effective management option.

Effectiveness and distribution of seed treatments continues to be a major concern. Dwarf bunt was a minor problem, but did make grain unmarketable on several hundred acres, despite seed treatment with Dividend. Snow mould and fusarium seedling blight showed less control than desired. Individual seed analysis has shown less than adequate seed distribution even with state of the art seed treatment technology. This is an ongoing issue with little development work to address the problem.

Demand for Ontario wheat continues at high levels. Quality traits within the crop continue to expand and develop new market classes, often with premiums attached. Non-pastry (hard) white winters, and hard white spring wheat's are also under development.

Utilization of wheat in the feed market continues to be significant but overlooked. Estimates run as high as 200,000 tonnes used in this market even with good quality in the crop this year.

Fusarium in barley was much less of a concern this year with dry, hot weather after heading. However, some feeding problems have been reported and this continues to be a significant potential problem in the crop.

Spring cereal acreage took an amazing jump up this year. Barley acreage was up approximately 30%, with seed supplies actually sold out of better varieties this spring. Oat acreage decreased slightly, while spring wheat acreage increased to 50,000 acres.

Spring cereal yields were at record levels. The spring wheat crop averaged an outstanding 57 bu/ac, about 12 bu/ac above previous years. Some barley crops broke the 100 bu/ac barrier, and oat crops combined high yields with extremely high test weights.

The Oat and Barley Council of Ontario has been established and incorporated. The council hopes to represent the needs of farmers and industry, develop potential markets and marketing opportunities. The directorship covers processors, seed producers, and growers.

The Quaker Oat company has re-opened and expanded the processing/packing plant at Peterborough, due to excellent effort by plant management in Peterborough. Two plants in the United States have been closed rather than the Peterborough plant. With the expanded capacity the plant will process 60,000 tonnes of oat annually, and hope to source 40% or more of their needs from Ontario production.

With the high quality of this year's oat crop, many producers have been successful in meeting Quakers' needs. In conjunction with the OBCO, a research program has been established to investigate agronomic and milling techniques to improve the oat product. Marketing strategies are being designed which should address some of the previous shortcomings of oat procurement in Ontario.

A pilot program in conjunction with Con-Agra is underway investigating malt barley production in the province. This will focus on northern Ontario to reduce the risk of fusarium and vomitoxin problems.

Proposed changes in the variety registration process continue to impact on the industry, and the committee as a whole. The consensus of the committee is to continue with quality and disease as registration requirements, but agronomic factors will not be required. Performance tests are a better venue to test these characteristics. The committee has requested that kernel visual distinguishability be dropped for white wheat in Eastern Canada, as is the case in red wheat. This has met with opposition by the Canadian National Millers Association. If KVD is not dropped, it will have a negative impact on the new market classes of white wheat currently under development.

The continued pressure on performance testing is a frustration for the committee. A document was developed outlining the "Benefits of Cereal Performance Testing in Ontario". This document was

supported for wide distribution in the industry, and has been forwarded to the Executive committee of the OMAFRA/University of Guelph contract for their consideration.

Leaf diseases continue to cause yield and quality loss in the cereal crops. Of particular note, stripe rust of wheat was a significant problem for the first time in some wheat fields in the province.

The second wheat symposium was held to continue to develop linkages within the industry. This focus on how the industry can work together to provide wheat of specific quality in a pure stream should continue to expand market opportunities.

With excellent pricing opportunities, the winter wheat crop was poised to finally achieve the one million acre mark. However, mother nature was unkind during wheat planting, and only 540,000 acres of wheat have been seeded. Of these acres, at least half were planted late, and about 100,000 acres are already targeted for replant next spring due to extremely poor and spotty stands.

Spring cereal planting intentions are up significantly, with positive price signals and good yields in growers' minds from last year.

Winter barley performed well this year, however fusarium was a problem in the crop at some locations. Acreage continues to grow slowly.

Crop insurance for winter wheat in the Temiskaming district is being re-evaluated. The increased winter hardiness of some of the new winter wheat varieties may make winter wheat a viable crop across northern Ontario.

Concerns surrounding pantoea in the 2000 crop was investigated and addressed. Changes in the analysis of samples may be required.

Significant Research/Service Accomplishments

1.On tario Spring Wheat Action Plan

Accomplishment: Second Wheat Symposium.

Why was this work undertaken? There continues to be incredible opportunity for wheat producers, processors, and end users if specific quality traits could be developed and maintained as a pure stream from grower to end user. Several successful examples were profiled to all sectors of the industry in an effort to stimulate further networking and development of partnerships to facilitate more of these win-win scenarios.

Who did the work and how was it extended? This was an effort of the Ontario Wheat Producers Marketing Board, supported by industry and OMAFRA and AAFC.

Number of Benefactors: Producers, seed houses and millers and end users can all benefit from this effort.

Dollar Impact: Premiums of $10.00/tonne are common, relating to increased value to the producer of up to $10,000,000/year. Estimates of the value across industry players run to $40,000,000/year and more.

2.Re gistration and Evaluation of Folicur

Accomplishment: Folicur was given a second emergency registration in time for application on the Ontario wheat crop.

Why was this work undertaken? Fusarium continues to be the number one concern in wheat production. The fungicide Folicur, along with genetic tolerance, may allow for significant reduction in fusarium infections and related toxins. This product has been available in Europe and more recently in the U.S., but is not yet fully registered in Canada.

Who did the work? This was a co-operative effort between Bayer (sponsors of Folicur) and the disease pathologists across Canada. The Ontario component was spearheaded by Dr. Art Schaafsma of Ridgetown College, University of Guelph, supported by OMARA and industry. An alert website was developed, with ground truthing ongoing.

Number of Benefactors: The entire industry benefits

Dollar Impact: Variable, depending on the year. Has been as high as a $60 million dollar loss. In 2000, fusarium again had a major impact on growers, with estimates of 50 to 60% of the crop grading feed due to fusarium. The 2001 crop was a near miss. On farm evaluation of folicur indicated a 1/3 reduction in fusarium damaged kernels. Work is ongoing.

Emerging Needs and Issues

1. The need for a constant supply of wheat is again plaguing the industry. Low wheat acreage, coupled with high demand, has brought this into sharp focus. Techniques and agronomic practices that ensure wheat acreage on an ongoing basis are essential!

2. The expanding market for wheat in Ontario is an incredible opportunity. The shift to a wide range of non-traditional breads by the consumer has greatly broadened the adaptability and opportunity for non-pastry wheat in the province. Mills operating at 100% capacity indicate the demand that is available for our product.

3. The on-going fusarium saga seems perpetual. It has become obvious that there is a grave need for the development of a reliable measurement tool of fusarium tolerance/resistance from a pathological standpoint. Until we can accurately measure the disease reaction, it will be incredibly difficult to provide the Ontario producer with predictive measurements of varietal reactions to Fusarium.

4. It is evident that some producers are driven primarily by net returns from individual crops, rather than following agronomically sound rotations. The value of these rotations needs to be investigated, particularly for soybeans, to make producers aware of the economic and soil health advantages of maintaining proper rotations. Also, some investigation of the disparity in wheat yields between areas of relatively equal corn and soybean yields needs to be undertaken, in order to increase wheat yields to economic levels in all areas.

5. With no genetically modified wheat available in the marketplace, it has been simple for the industry to give assurances that products were indeed "non GMO". However, with a roundup ready spring feed wheat close to release in western Canada, this situation may change dramatically. The

industry is now faced with determining how best to meet consumer demands, while allowing beneficial technological developments to occur throughout the industry.

CORN

State of the Corn Industry in Ontario

Production

Grain corn acreage in Ontario rose to 1.93 million acres in 2001 compared to the previous five-year average of 1.77 million acres (See Table 1).

Silage corn acreage continues to expand as silage occupies an increasing percentage of cattle rations. Corn silage acreage estimate for 2001 is .34 million acres.

Average provincial grain corn yield for 2001 is estimated to be 104 bu/ac compared to the five-year average of 117 bu/ac.

Production was most seriously limited in 2001 by low rainfall in the months of July and August. Precipitation in these two months generally averaged 30–50 percent of the 30-year normal.

Corn acreage predictions for 2002 are high due to 1) lower winter wheat plantings than anticipated, 2) better profit potential for corn than for soybeans under current market conditions, and 3) concerns over soybean insect and disease problems.

Table 1. Grain corn acreage, production and value statistics for Ontario, 1991-2001.

YEAR*	AREA (ac) (Million)	YIELD (Bu/ac)	PRODUCTION (Bu)(Million)	$ VALUE (Million)
2001/02[1]	1.93	104	201	$693
2000/01	1.68	105.1	177	$570
1999/00	1.81	128.3	232	$638
1998/99	1.85	128.8	238	$702
1997/98	1.8	115	207	$800
1996/97	1.75	107.6	188	$838
1995/96	1.725	117.1	202	$929

1994/95	1.60	120.6	193	$619
1993/94	1.675	107.5	180.1	$602
1992/93	1.4	97	135.9	$371
1991/92	1.89	111	209	$558

1 Forecast

Grain Corn Supply and Demand

Feed and industrial use of grain corn in Ontario both continue to increase. However, the most dramatic increases in grain corn use is on the industrial side and estimates continue call for expansion within this market. (See Table 2).

Growth in the industrial demand for corn in the short term will come from 1) an expansion of capacity at the Commercial Alcohol plant in Chatham, 2) the construction of the new Seaway Alcohol plant at Cornwall and 3) the construction of the JBL citric acid plant at Port Colborne with a projected demand of 14 million bushels.

Future increases in the industrial demand for corn will come from the biofuel (alcohols) and biochemical (organic acids, polyols, and plastic replacements) sectors.

Imports rose dramatically in 2000/01 to 70 million bushel, or more than 4 times the previous five-year average.

Ontario is a net importer of corn and will be until acreage or yield levels boost production sufficiently in order to stay in step with rising demand.

Table 2. Grain corn production, imports and usage in Ontario.

	2001/02[1]	2000/01	1995-1999 (average)
	(million bushels)		
Ontario Production	5445	177	213
Ontario Imports	55	70	16
Feed Use	156	155	142
Industrial Use	84	82	63

1 Forecast

Corn Hybrid Development and Evaluation

Private sector development and evaluation of corn hybrids for Ontario continues to be very active. Seed company support for and participation within the OCC hybrid performance trials was strong in 2001.

Hybrids with genetically modified traits made up a significant portion of the market in 2001. Growth in market share for herbicide tolerant corn hybrids, particularly Roundup Ready is expected to be significant in 2002. Some expansion of Bt hybrids in terms of total market share is also expected. (See Table 3)

More rapid expansion of Roundup Ready hybrids may occur depending on the status of genetic event acceptance in the European Union.

The Ontario Corn Committee recognizes that unbiased evaluation of RR corn hybrids is not being accomplished in the province due to the seed companies reluctance to enter these hybrids in performance trials that receive conventional weed control. The OCC has set in motion the testing of RR hybrids on a pilot project basis at Woodstock and Waterloo in 2002 to address this need.

Table 3. Genetically modified hybrids as a percentage of the Ontario market.

Corn Type	1999	2000	2001	2002[1]
Bt	28	30	32	33
Liberty Link	4	8	9	10
Roundup Ready	1	3	5	8

1 Forecast

Corn Production and the Environment

Corn production practices and their impact on water quality are and will be under greater scrutiny. More research and extension will need to address a "systems" approach to manure management and corn production. This systems approach will need to ensure tillage work does not exist in isolation from manure application technology.

Site Specific and Year Specific Nitrogen Management: Although a nitrogen soil testing program for predicting N is available, it's acceptance as a tool to more accurately define N requirements both from field to field and year to year is very limited. Continued expansion of this technology is imperative for both environmental and economical reasons.

Emerging Needs and Issues

Ear rot and Fusarium infection in grain corn continues to be one of the most serious impediments to the improvement of the corn industry. Progress has been made on the development of genetic markers associated with fusarium resistance.

Cold tolerance research has defined some of the genetic differences that exist pertaining to late season cold tolerance. Techniques have been developed for testing the late season cold tolerance of corn hybrids and inbreds.

Increasing energy costs and the impact on field operations, grain drying and synthetic N fertilizers continue to reduce the profitability of corn production. Research and adoption of lower energy input cropping systems will be increasingly more important and attractive.

Development of the food grade corn industry within Ontario continues to attract interest and research efforts. The food grade corn market continues to expand. Work has moved forward on the identification and development of suitable hybrids, agronomic practices favouring grain quality, and drying and handling systems to meet food grade expectations.

Variant types of Western Corn Rootworm have been identified in the US corn belt that lay eggs in soybeans and thus force growers into using soil applied insecticides to control rootworm feeding even in a corn-soybean rotation. Work at the University of Guelph is developing DNA based techniques for identifying the variant rootworms.

EXECUTIVE SUMMARY - STATE OF THE INDUSTRY

Soybeans:

Ontario soybean acreage has stabilized at around 2 million acres, with an estimated 2.1 M acres planted this year. The introduction of new, early maturing varieties continues to move the borders of short season production areas.

Field crop prices remain relatively low, keeping soybeans competitive in the Ontario crop mix. Why?

the introduction of new high yielding varieties
market opportunities
lower production costs than corn
year to year yield stability

This is the first year that soybean yields have plummeted across the province with a yield estimate little more than 50% of long term average yields (approx. 40 bu/ac). Why?

very dry weather across the province
many days/weeks of above 30° temperatures
soybean aphids

Soybean aphids - despite being relatively new to Ontario, this pest literally covered Ontario's soybean crop with numbers/plant in the 100's and 1000's in broad areas. This coupled with the dry weather and heat devastated this year's 'never fail' soybean crop.

Identity Preserved (I.P.) Soybeans - A key component to Ontario's soybean industry this acreage of I.P. beans has increased steadily over the last 5 years. Continued growth in demand for non G.M. beans and special food grade soybeans along with Ontario's ability to segregate has fueled this segment of the industry.

I.P. Soybeans - Attractive appearing premiums enticed many growers into this market. However, quality concerns and low yields have growers wondering about the future in this area. Combine capacity is compromised with limited harvest hours and the threat of contamination (ie. changing from corn to beans or non GM beans to GM beans as weather allows)

Non G.M. Marketplace - a fragile but significant market for export beans. The regulating system is in a state of flux in much of Europe (ie. RR beans can be imported but may need to be labelled as a G.M. product) A moratorium on new traits derived from biotechnology in Europe keeps the future in limbo.

I.P. Low Yields - quality issues. Not just a producer issue, the production problems this year threaten Ontario's reputation as a supplier of choice to I.P. buyers especially special food grade soybean classes. Province wide production concerns (drought, heat and aphids) have reduced the supply of quality beans well below export contracts.

The acreage of RR (Roundup Ready) beans is estimated to be 50% of the total acres or higher next year (up from 35% this year). Problems with weed control, improved RR varieties and the quality, yield, premium issues of the I.P. sector are driving this growth.

The soybean variety registration process continues to be under review . The current proposal is for soybeans to fall under schedule B - registration without merit requirements but requires 1 year's performance data.

Growers believe that a strong performance testing system is critical to the success of the soybean industry in Ontario. With development of new traits through biotechnology this performance data is critical in evaluating the potential of these new varieties to Ontario producers.

Future direction points to a "biobased/life science" economy. Performance data and the regulatory process will be key in ensuring new technology will benefit all from growers to consumer. The potential is unlimited but will include many small niche markets as well as large commercial opportunities. Remember a 'niche market' is just that!

The availability of research dollars will continue to grow the industry - just look at the last 25 years.

Canola:

Estimated crop of 35,000 acres this year with above average yields and respectable prices. Growers are looking to possibly increasing their canola acres next year - cannot say the same about soybeans at this time.

Trials with fall seeded spring canola (treated seed) have been less than successful. Temperature fluctuations and soil moisture are quite different here than in W. Canada.

Hybrid canola now dominates the market. There is a need for renewed research into production parameters with these hybrids. With more yield potential than open-pollinated varieties, adjustments, seeding rates, row width, N requirements may be needed to reach optimum yields.

75% of Ontario's canola crop is RR (Roundup Ready) leading to potential problems with controlling volunteer canola (ie. in RR beans) as well as the threat of cross pollination between non-GMO and GM crops (perhaps even cross-species)

Producing non GM seed is an issue - again the threat of cross pollination. As a result this seed is grown in isolated areas.

The cost of Helix treated seed (literally double) has growers calibrating, calibrating, calibrating their seeding equipment. Overseeding costs money. Some are looking at 14" rows and more precise seeding rates.

INDUSTRY/SECTOR SCAN

state of the industry
major accomplishments
emerging issues

2001 Issues

1. Plant Genomics. Current support of agricultural plant genomics is low in Ontario and needs improvement.

The science of Genomics is the study of the activity many genes in time and space. The information generated from genomics will be available to scientists studying individual genes or processes. Genomics funding needs to be broad based and come from both the provincial and federal levels.

2. Environmental Impact. Recommend the formation of a team to address the impact of soybean production on the environment.

Agricultural activity impacts the environment. To address the concern of many in the non-agricultural sector, the impact of agricultural impacts on the environment needs to be well defined. Agricultural producers endeavor to be good stewards of the environment and undertake production methods to mitigate their impacts on the environment. A team of multi-disciplinary team of scientists will be able to outline current efforts toward environmental stewardship and to identify new research to address the impact of soybean production on the environment. This team could include cropping systems researchers, weed scientists, agronomists, agmetiorologists, soil and water scientists.

3. Need for a cropping systems physiologist at University of Guelph

A oilseed physiologist position at the Plant Agriculture Department is needed to provide research in the following areas: reduce inputs of herbicides, fertilizers, or pesticides; reduced tillage; nitrogen fixation, especially as soybean moves to shorter season areas with cooler soil temperatures; development of winter canola production systems, especially an understanding of traits involved with winter survival.

4. Increased attention to alternate uses for soybean. Invite interaction with UG and AAFC-Guelph food scientists.

Increased uses for soybeans will provide opportunities to increase markets and to add value to soybeans. The OOPSCC committee members would invite further interaction from food scientists from the University and Federal Labs at Guelph.

FORAGES

State of the Industry

Forage crops remain an essential component of Ontario's agriculture. They are grown on 65 per cent of the farms in the province and cover 28 per cent of the field crop area. Forages continue to be the foundation of the dairy, beef, sheep, goat, horse, rabbit and game farming industries located in the province. Forages supply 60-80 per cent of the nutrients fed to those animals.

Forages allow Ontario farmers to produce milk and meat at a relatively low cost and in turn allows consumers to enjoy a plentiful food supply at a modest cost. The forage industry and the industries that are dependant on them greatly contribute to the wealth of Ontario. The equine industry alone generates more than four billion dollars annually.

EXECUTIVE SUMMARY

A stakeholders meeting was held in January 2001 in Guelph to position the OFCC solidly behind the forage interests in the province. Recommendations were given high, medium and low ratings to reflect priorities of the group.

Highest priority went to managing climate related risk. Perennial forage winterkill remains a top concern to be addressed through a combination of genetic/biotechnology improvements combined with on farm management techniques. The second high priority is improving feeding value through genetic and biotechnology to improve energy and other traits combined with improvements in on farm management to optimize feeding potential. The third high priority is to continue and improve the public system of forage variety testing to identify varieties and provide producers relative performance information.

The first medium priority is forage yield which encompasses genetic yield improvements along with on farm management. Forage preservation and storage were identified by producer groups as areas of continued losses.

Forages and the environment led the lower priority group. Forages have a major role in improving the environment from riparian erosion control through to carbon sequestering. Other lower priorities include corn silage hybrid testing, annual forage evaluation, designing and implementing a forage grading system and the long standing issue of weed control in forages.

Much of the effort of the OFCC in the past year centred on the Canadian Food Inspection Agency's notice of intent to drop the requirement for merit testing for registration along with OMAFRA's monetary intentions. As a result OFCC has restructured the testing fees to make them fully cost recovery. At the same time, new testing options have been opened to the seed trade industry to more fully meet their needs for testing and evaluations of new lines. It is anticipated that these will bring an expansion of forage testing at full cost recovery.
The OFCC has endorsed CFIA's most recent regulatory proposal to put crops under proposed schedules A, B and C. The committee recommends that the only forage specie included under Schedule A be reed canarygrass because of quality concerns. OFCC recommends that all other forage species of significant use in Ontario be included under Schedule B. The OFCC supports CFIA's proposal to require agronomic performance data be available at the time of registration. The OFCC recommends that the minimum acceptable agronomic data be 3 station years of herbage yield information from the second or later harvest years.

In other functions of OFCC, production meetings through to variety site inspections all progressed well throughout the year.

Forages are grown for conserved feed on 907,000 hectares.Most forages are used on the farm where they are grown. In 2000, the value of forage produced on Ontario farms was valued at $393 million. Ontario hay has a reputation around the world as being of high quality. Pasture is grown on a large number of farms in Ontario with about one third of the acreage as improved pasture. A broad range of legume and grass species are used in pastures. This is due to the diversity of growing conditions, management practices, production goals and livestock preferences. As an example meadow bromegrass is a valuable, but little known early pasture species that has been included in OFCC testing and is now on the recommending brochure. Red clover continues to be the legume of choice for plowdown use by cash croppers for a variety of reasons.

The major seed producing crops in the province are red clover, timothy and birdsfoot trefoil. In recent time, water quality and manure management have become major issues in the province. Forage crops are playing a major role in these issues through the establishment of grass buffer zones along the waterways and by having grass fields available to utilize manure nitrogen efficiently.

The diversity of forage species that are used in the province allows farming to be a viable option on all but the poorest classes of soils. Forages therefore support the economic health of all of Ontario's rural communities. Forages are also important to Ontario because they protect and rejuvenate soils, improve wildlife habitat and increase the beauty of Ontario's landscape. With an increased emphasis on environmental concerns, specifically manure usage and water quality, it is important to recognize the place of forage crops in utilizing nutrients and filtering runoff water from farmland. By encouraging more forage use in the province, we are indirectly reducing environmental concerns.

Production of forages whether as hay or pasture varies considerably from region to region and from year to year. The major factors for this are winterkill and distribution of rainfall. Excess rainfall as experienced in the summer of 2000 produced an abundance of forage, but quality was seriously depleted for dairy and equine users. Higher cost supplements had to be used.

First cut forages were in good supply in 2001, however prolonged drought reduced second and third cuts to very low levels. In extreme cases forage plants were lost to the drought conditions. Hay prices have increased significantly in some areas of the province, but remain stable in other areas. Many growers faced with low supplies going into the winter were forced to take unexpected cuts in the fall which could result in a significant reduction in winter survival.

Emerging Needs and Issues

A forage industry stakeholder meeting of the Ontario Forage Crop Committee was held on January 26, 2001, at 1 Stone Road West. The diversity of the industry across the province was represented by the 16 participants. The primary purpose of the meeting was to determine research priorities for the forage industry and rank them. Secondly, budget restraints and personnel changes at the University of Guelph and the colleges have caused a reduction in research effort in forage crops. The meeting was also a forum for industry to determine what it wants from research and provide a more effective lobby on behalf of forage crops. Finally, changes to the variety registration system in Canada and its implications for variety testing were discussed. During the morning a Feasibility Study by the Ontario Forage Council was discussed as well as possible funding options to support research.

The afternoon program was led by Stuart Budd of OMAFRA. The afternoon program focussed on the agenda regarding the establishment of research priorities. The following were identified by participants as issues, opportunities, or challenges for the forage sector:

Forage crop longevity
Loss of nutrients during harvesting
Lack of species to cover dormant periods (ie: mid-summer)
Yield
Feed quality
Novel plant traits
Carbohydrate and sugar levels
Forage variety evaluation (including quality)
Preservation and Storage systems
Large bale systems
New concepts of preserving forages
Environmental benefits of forages
Legislation affecting forage use
Pharmaceutical traits
Yield
Forage grading system
Corn silage
Other annual silage crops

It should be noted that extension issues were deliberately set aside during these discussions. Extension issues are acknowledged to be imperative, but separate from research priorities.

From the above list of issues, some grouping was done. Several of the issues fit into the existing list of research priorities and others remained as separate issues. The final list of issues, in no particular order, was:

Managing Climate Related Risk
Forage Feeding Value
Forage Variety Testing
Forage Preservation and Storage
Environmental Implications
Pharmaceuticals - Note this was later dropped from discussion due to its limited application to commercial forage production.

Yield
Forage Grading
Corn and other Annual Silage Crops
Weed Control in Forages

With regards to corn silage, it was noted that a separate but critical issue is to determine which crop committee (corn or forage) should and will be responsible for carrying out research in this crop.

J. Johnston led a discussion on the changes to the forage variety testing system. As of July, 2002, seed companies will be able to register new forage varieties without any Ontario yield testing being done. This puts at risk the ability of the OFCC to provide independent yield data for producers. However, since producers and many companies appear to be in favour of a continuation of performance testing, the OFCC has prepared a protocol for voluntary forage variety testing to commence in spring 2001. NOTE: As of November 14, 2001, the CFIA has revised their regulatory proposal and the possibility exists that some performance testing may be required prior to registration being granted. However, at the time of writing, it is not clear whether mandatory public testing will be retained or not.

The key changes from the previous system are that companies can enter only the varieties they wish (or none at all) either before or after the variety is registered. Companies can test at one or more (or no) locations at their discretion. It is the responsibility of the individual sponsor to ensure that they have sufficient data available for the committee to reach a decision on support (or non-support) for registration. A new fee structure for testing has been proposed which would require sponsors/distributors to purchase a membership if they wish to be included in OFCC extension material (brochure, popular press inserts, web site). Non-members could continue to test varieties but would not be included in OFCC extension publications. At the time of writing this fee structure is being circulated to the industry, so no information on uptake can be provided. The committee will also make a determined effort to gain buy-in from commodity groups, primarily dairy, beef, and sheep groups, initially from in-kind contributions (ie: distribution of extension material) and secondly by direct purchasing of memberships by the commodity groups.

Those in attendance felt that every effort should be made to ensure a maximum number of new varieties were entered into the voluntary testing system. Johnston emphasized that the testing system would likely be used if producers made use of the information that resulted and made purchasing decisions based in whole or in part on the test results. If the data is not used, there will be no incentive for the trade members to participate.

Pest Management - Weeds

Executive summary

The Ontario Weeds Committee met in April, July and November of 2001. The main activity in November was the updating of Publication 75, Guide to Weed Control 2002.
Weather conditions in 2001 proved to be challenging again and this often affected negatively the performance of herbicides. The threat of herbicide resistance in increasing with many reports of ragweed escaping treatments with Group 2 herbicides. Other trends observed include the increase in the use of low drift nozzles, the reliance on post-emergence herbicides despite the emergence of problem weeds, and the continued use of herbicide tolerant crops..

Committee Activity

The Ontario weed committee has met on the 11th of April 2001 in London. Sub-committees made their report. Some discussion revolved on priorities and it was decided that a vote would take place to establish a ranking. The committee broke in smaller group to discuss on what the future of Weed Science in Ontario would be. The Ontario Weed Tour was held July 16th to 19th in Centralia, harrow, Woodslee, Ridgetown, Simcoe and Elora. The committee met at Ridgetown on the 18th of July to approve ranking of priorities. The fall meeting was held on the 5th of November in Guelph. The main task of the committee was the update of Publication 75, Guide to Weed Control 2002.

Sector scan

Weed Control Results

Weed control was challenging again this year. A good April lead to a cool damp May, not leaving many days with good soil conditions for planting late spring crops and stressing the growth of early planted crops. Late frosts and hail hurt several areas, and windy conditions made spray applications risky at many times. Once the rain stopped, it didn't start again in many areas until harvest. The summer's prolonged dry spell was the worst in 50 years.

Soil applied herbicide worked very well in the corn crop but opportunities for soil applied spraying in soybeans were challenging. Postemergence spraying was likewise challenging with many fields sprayed beyond the optimum stage of growth and control was reduced. Weed escapes were visible in many fields, especially as the crops stopped growing under severe drought. This weed competition through the critical period, in combination with the severe drought, and the infestation of a new pest, soybean aphids, hurt yields by as much as 50% in soybeans. The continued threat of soybean aphids may reduce the acres planted to soybeans next year.

Trends

- Use of post-emergent herbicides in corn and soybeans continues to be widespread, but the development of new weed problems, including herbicide resistant weeds may slow this trend.
- Low drift nozzles continue to be widely used by both grower and custom applicators.
- No-till or reduced tillage systems are increasing in most crops, and have altered the weed populations.
- GM crops continue to be planted, but market uncertainty will continue to temper the growth of this technology. Roundup Ready (RR) soybean varieties have about 35% of the acreage, while canola is greater with 75% RR varieties. In corn, there is about 9% planted to Liberty Link and 5% to Roundup-ready. There is an awareness of the risk of genetic drift in canola but it has not been documented in Ontario.

Problem Weeds

Common weeds like red root pigweed, ragweed and lamb's-quarters eluded many of our control programs this year. No-till weeds like spreading atriplex, sow-thistles, and prickly lettuce continue to increase. Lots of grassy weeds escaped herbicide treatments this year, with foxtails (especially yellow foxtail) being an increasing

problem. Horticultural growers are challenged by common groundsel, yellow nut sedge, proso millet, hairy nightshade and controlling weeds in general.

Herbicide Resistance

Red root and green pigweed resistance to Group 2 herbicides are now common, especially in the areas first identified in 1997. New in 2001 is Group 2 resistance in common ragweed, with over 120 suspected samples from southern Ontario to be tested. Eastern black nightshade has also been confirmed with Group 2 resistance. Pigweed resistant to linuron has also been confirmed on carrot farms in several locations. There is awareness of the risk of resistance among farmers, especially with widespread use of glyphosate and more adoption of recommended management techniques.

Weed Control Act

There were approximately 500 weed orders issued in 2001, which is similar to records for recent years. The majority of these are in urban areas. Weed inspectors are encouraged to enforce the Weed Control Act only on properties adjacent to agricultural lands.

Minor Use Program for Herbicides

Jim Chaput is the OMAFRA Minor Use Coordinator in Guelph, who maintains a website with updated information on Minor Use Proposals at www.omafra.gov.on.ca/english/crops/minoruse/. Currently there are 83 active minor use requests for herbicides of interest to Ontario growers. 16 herbicides were registered through the MUPP program this year that will be included in the 2002 Publication 75.

Extension Activities

The new organization of extension services across Ontario is now fully implemented with 2 weed management specialists. The Weed Management Specialist (Field crops) is vacant, with the competition closing November 30. In addition, we have engineering specialists in application technology, and crop specialists for each crop who handle all aspects of production, including weed management.

- Guide to Weed Control (Pub 75) remains as an annual publication. The 2002 version, revised by the Ontario Weed Committee, will be available in early January.
- Ontario Weeds (Pub 505) is in revision with publication in 2002. 37 new weed species are included.
- New Factsheets were published on Herbicide Resistance, Organic Farming, Cocklebur, Pigweed, and Field Bindweed.
- The Ontario Weeds page online at www.gov.on.ca/OMAFRA/english/crops/insects/weeds.html A free subscription service has been added this year for notices of new content posted.

Global issues

The government of France has recently announced the phasing out of atrazine. This news, coming from a major agricultural country, forewarns of increasing pressure on this type of herbicide. This should be seen as a major concern for Ontario corn growers as the withdrawal of atrazine in Canada would have major impact on weed management. This should be seen as further incentive for the adoption of technologies and systems that will show responsible use of our herbicides.

Pulse Crops

State of the Industry

Executive Summary:

White bean acres in Ontario have declined by 60% during the last 10 years to 58,000 acres in 2001. In addition average yields have not increase during this period. Lower costs of production, and increases in average yield have resulted in a shifting of acres to newer production areas both within the province and to Manitoba. Coloured bean types have increased in acres to over 50,000 acres, a 230 % increase over this same period. Total value of edible beans to Ontario producers is approximately $40 M.

II. The White Bean Producer's Marketing board has moved to allow off board contracting of production.

III. Coloured bean registration has changed to listing without merit system, to respond to changes in the market place towards an Identity Preserved system.

IV. The development of a white bean variety (OAC Rex) with resistance to common bacterial blight is an important accomplishment. However, it raises concerns with the definition of what constitutes PNT, and conventional breeding.

V. IPM research utilising experimental seed treatments for the control of root rot and leafhopper are very promising

VI. The rapid expansion of pulse acres in Western Canada 2500% since 1980 has outpaced research and extension to serve the industry, creating the demand for a national research strategy. Pulse Canada would serve in a co-ordinating and leadership role for pulse research in Canada.

VII. An emerging priority for research is the development of speciality edible bean types and alternative markets or market uses. Ontario has a mature industry that is well positioned for a niche edible bean market.

Industry/Sector Scan:

White Bean State of the industry

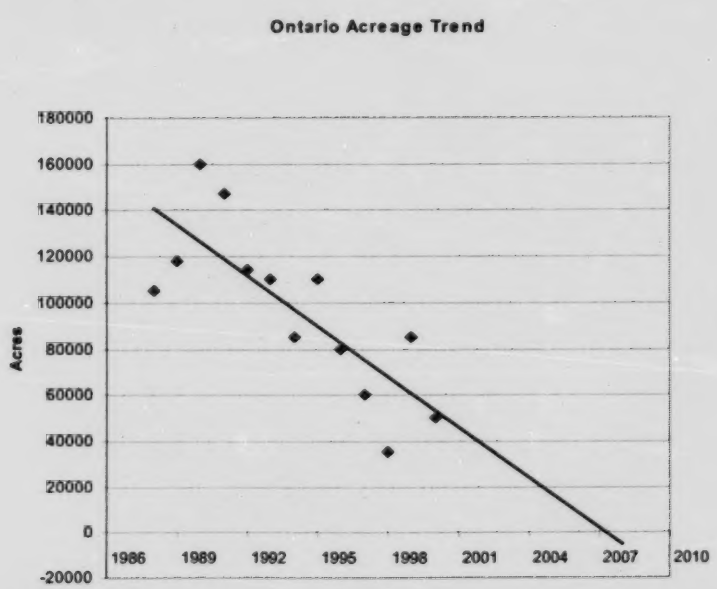
The viability of the Ontario White Pea Bean (WPB) industry is in question. Ontario's WPB acres have been declining for the past 10 years (See Table 1: Acreage Trends) but industry stakeholders live in the hope that acres will rebound and return to levels of 10 years ago once 'prices turn around'. Innovative pricing and or marketing alternatives have been floated to stem Ontario's acreage erosion. Approximately 75% of the 2001 white bean crop will be marketed outside the pool system through production contracts. Production contracts were introduced in 1998 following the recommendations of a study completed by the George Morris Centre for the industry and grower associations. Global consumption of WPB has been static near 7 million cwt. for the past 25 years. There have been no noticeable changes in consumption patterns. North American acreage has been around 500,000 acres and N.A. production accounts for the majority of world production. Manitoba has become a significant producer, with an economic advantage over Ontario due to lower land costs. Average yields in Manitoba are now similar to Ontario's (Table 2). Lower NA production in 2001 has resulted in a strengthening in price to the grower. Total 2001 acres planted in N.A. decreased due to large carryover stocks. Michigan experienced a disastrous growing year while Min/Dak. and Manitoba was average. Higher prices are likely to result in acres rebounding in 2002, perhaps above the 500,000 acres the market normally requires. The industry estimates that 85,000 acres of WPB are required in Ontario to remain viable. In 2001, yields were significantly reduced, as was seed size by the dry weather.

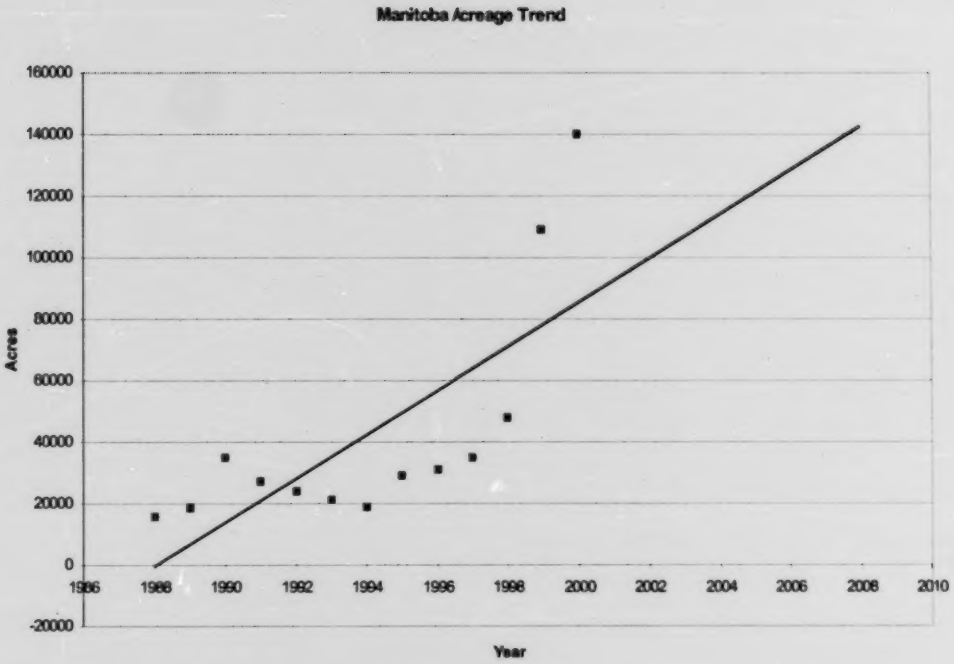
Table 1. White Pea Bean Acreage Trends '000's Acres

Year	Ont.	Mich.	Min/Dak.	Man.	Total
1988	105000	205000	206000	15500	531500
1990	160000	235000	257000	35000	687000
1992	114000	235000	160000	24000	533000
1994	85000	250000	160000	19000	514000
1996	80000	200000	190000	31000	501000
1998	35000	90000	180000	48000	353000
1999	80000	150000	235000	109000	574000
2000	50000	135000	225000	140000	550000
2001	58000	48000	125000	115000	346000
% change from 1990	(64 %)	(80 %)	(50 %)	+ 228 %	(50 %)

(Table 2) Average White Pea Bean Yields

Year	*Manitoba*	*Ontario*
1988	5.80	12.20
1989	5.81	13.15
1990	11.00	13.47
1991	11.57	16.73
1992	8.60	8.07
1993	4.61	14.14
1994	15.32	15.83
1995	14.04	17.38
1996	14.68	11.06
1997	14.00	14.77
1998	14.00	14.42
1999	16.00	17.24
2000	16	12




Manitoba Acreage Trend
160000
140000
120000
100000
80000
60000
40000
20000
0
-20000
Acres
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year

Coloured Bean State of the industry

Ontario coloured bean acres has increased over the past 10 years by over 230% to the 50,000 mark (Table 3). Acreage increased significantly in 1999, which can be attributed in part to the introduction of new types of production contracts. U.S. per capita consumption of Pinto, black beans and to a smaller extent cranberry has increased over the past 10 years, attributed in part to the growing Hispanic population. One significant trend is the average price for beans on the world market is dropping. This indicates greater economies of production are required as new production regions emerge. In Ontario, the 2001 production and seed size was reduced significantly by the dry weather. Japanese type bean yields were very disappointing, attributed to flower abortion from the drought & high temperatures during the latter part of July through early August. Lower production across the major producing areas in N.A. in 2001 has resulted in higher harvest prices. Research projects that OCBGA fund include breeding programs for Dr. Tom Michael's, Dr. Soon Park, Dr. Kangfu Yu, Biological Control of White Mold, Root Rot Trials, leafhopper seed treatment trials, timing of Desiccant Trials, Performance and Variety Trials and Weed Control. Joint consumer promotions with the Ontario White Bean Producers Marketing Board are undertaken throughout the year.

Table 3. Coloured Bean Acreage (Major classes)*

Year	Insured	Average Yield
1991	15,182	18.4
1992	13,547	7.9
1993	19,108	15.9
1994	20,837	16.9
1995	25,781	17.1
1996	22,315	12.5
1997	23,527	17.1
1998	24,885	17.3
1999	43,666	16.2
2000	44,244	10.2
2001	53,377	-

* Figures supplied by Agricorp

Significant Research/Service Accomplishments

Cultivar Development and Genetic Improvement

Accomplishments

- First white bean variety (OAC Rex) with resistance to common bacterial blight (CBB) was registered
- Identification and Utilization of molecular markers to aid selection for plants resistant to common bacterial blight. Breeding work continues to incorporate resistant genes for bean common mosaic virus (BCMV), anthracnose, and CBB.
- Mechanical damage study completed in response to buyer concerns with increased incidence of damage in some white bean varieties. Screening methodology developed to screen varieties for damage.
- Alternative pulses – variety development of mung beans, kintoki, adzuki, otebo and pigeon peas, along with agronomic practices. Multiplication of AC Harosprout mungbean and AC Gemco

Why was this work undertaken. Common bacterial blight is a serious seed borne that occurs each year in Ontario and is especially important in seed production.
Otebo and Kintoki bean production in Ontario has increased that is exported to Japan as a high value niche crop. Ontario imports over 4 m pounds of Mungbeans that are processed for bean sprouts. Import replacement and export opportunities exist for mungbeans.

Who did the work and how was it extended AAFC, Harrow and University of Guelph. Variety OAC Rex was released. AC Harowsprout mungbean and AC Gemco adzuki bean seed has been distributed to select seed growers.

Number of Benefactors Public, private breeders benefited in the identification of molecular markers to aid in selecting resistant lines. Entire industry benefits in managing associated production risks. Ontario is well positioned as niche market supplier of edible beans.

Dollar Impact **Variable**, depending on the year. Ontario's mature industry, has strategic advantages as a supplier for niche markets.

Accomplishments Outdoor bean show at farm of Pat & Jane Elliots
Why was this work undertaken - extend information on harvesting quality beans. This included advancements in harvesting technology, along with speakers on bean harvesting for quality.
Who did the work and how was it extended. Day co-ordinated by Chris Gillard, RCAT with support from OMAFRA, White and Coloured bean growers, and industry.
Number of Benefactors Entire industry benefited from collaboration on improving bean quality
Dollar Impact. Quality directly impacts ability to market beans and the long-term reputation of Ontario for producing quality.

Issues with Research Priorities

1. Genetic Improvement, and Cultivar Development & testing of White and Coloured Beans
2. Edible Bean quality evaluation and utilization.
3. Integrated Pest Management for Root rot & leafhoppers.
4. Integrated Weed Management
5. Development of alternative pulses, specialty market types and markets
6. Development of agronomic Practices that utilize innovative technologies, enhance sustainable production and exploit the yiled potential of new cultivars

Issues without specific research priorities

7. Technology transfer. It is critical that OMAFRA continue to allocate resources to technology transfer in order for Ontario to have an economically strong, growing, and sustainable edible bean industry.

8. Biotechnology.
Ownership of genes, transformation processes, and technologies impede the advancement of the industry through public/ private breeding efforts. Health concerns with PNT is interfering with the registration of varieties developed using traditional breeding techniques (E.g. OAC Rex). CFIA & Health Canada are concerned that OAC Rex is a novel type, and have requested that OAC not only prove that the variety is not different from other registered varieties, but also to pay for and produce the data for base line numbers for other registered varieties.

9. Weed Control. Weed control herbicides available in edible beans relies on testing of herbicides registered for soybeans. The focus of herbicide research in soybeans has shifted from development of new active ingredients to introduction of novel trait herbicide resistance. In the next 5 years no new chemistry is expected to become available. This is of concern because of the reliance on group 2 chemistry, and the rapid increase of certain resistant weed biotypes. In addition limited chemistry exists for the control of certain problem weeds.
10. Flatulence. As the population ages, individuals develop more intolerance to high fibre diets. High fibre consisting of complex carbohydrates and partially hydrated starch contributes to flatulence

Tobacco

EXECUTIVE SUMMARY

- Excellent yields were harvested from the 2001 crop despite the below average rainfall throughout the growing season. Frequent irrigation during the drought periods have helped most growers boost both yield and quality of their crop. CT157 a new cultivar registered in 2000 constituted 67% of the 2001 crop.
- Incidence of diseases and insects were low in most tobacco growing areas for 2001 crop year.
- The variety sub-committee recommended for registration two newly developed cultivars, CT572 and CT144. These are high yielding cultivars with superior leaf quality. Registration was granted for these two cultivars. Certified seed is available to the growers for 2002 planting.
- Actigard provided efficient control of blue mold in fungicide screening trial.
- Emerging issues revolve around alternatives to soil fumigation, mechanical leaf harvesting, balanced leaf chemistry, and withdrawal of Imperial Tobacco Leaf from tobacco advisory committee (TAC).

COMMITTEE ACTIVITIES

Tobacco Variety Registration Sub-Committee

The subcommittee met on March 9, 2001 with representation from the Canadian Tobacco Research Foundation, Ontario Ministry of Agriculture, Food and Rural Affairs, Tobacco Seed Producers', Ontario Flue-Cured Tobacco Growers' Marketing Board and tobacco companies. The committee reviewed and discussed the following area:

Performance of regional registration trials conducted at Delhi, Waterford, Langton and Aylmer were throughly reviewed. Performance of registered cultivars, advance trials, and Quebec registration trials were also reviewed. Yield, grade index, and quality characteristics of the varieties included in these trials

were discussed.

On-farm testing, procedure similar to the one adopted by the Tobacco Research Institute in Zimbabwe was discussed for consideration in Ontario.
Growers expressed interest on some American cultivars. Testing the performance and adaptability of some promising American cultivars under Canadian conditions was discussed.
Testing Canadian hybrids and comparing it to the commonly grown cultivars in Ontario.
Blue mould screening work in Cuba.
Results of the On-farm testing of 95EA57-2, 95EA144-4 and RG81.
Membership list was reviewed.

Tobacco Production Practices Sub-Committee

The sub-committee met on November 1, 2001 with a representation from the Canadian Tobacco Research Foundation, Ontario Ministry of Agriculture, Food and Rural Affairs, Ontario Flue-Cured Tobacco Growers' Marketing Board and tobacco companies to discuss the following:

Protection issues

2001 pest problems- discussion revolved around the number of incidents of Tobacco Mosaic Virus (TMV), breaking down of CT157 in the field and the damage caused by Bacterial Soft Rot seen after harvest.

The incidence level, plant losses and confirmed cases of 2001 tobacco pests during greenhouse seedling and field production were presented and discussed.

Aspergillius and bacterial soft rot were more prevalent in the 2001 crop.

Acrobat MZ approved by the PMRA and possible registration of Actigard is being discussed with the PMRA

Production practices issues
Recommendations-additions, deletions and revisions to Flue-Cured Tobacco Production Recommendations (Publication 298) in regards to recommended cultivars in Canada.

Research priorities in the field of breeding, agronomy, plant pathology and indirect heat exchangers were discussed.

SIGNIFICANT RESEARCH ACCOMPLISHMENTS

1. New varieties

Two new cultivars, CT572 and CT144 were recommended to the growers during the 2001 variety meeting. These cultivars produced high yield and superior leaf quality compared to the check cultivars Delgold and Delfield. Breeders' seed of these cultivars is being multiplied by the seed growers and will be available to tobacco growers in the 2002 growing season.

2. Actigard as a chemical control measure for blue mould

Blue mould is becoming a serious problem in the tobacco growing areas. Alliette and Acrobat MZ provide some control to blue mould. Experiments conducted in the past two years at Delhi Research Station indicate that Actigard is significantly more effective in controlling blue mould. Registration of this product is being investigated.

3. TSNA

TSNA's is a major concern to tobacco leaf industry and is expressed as a result of direct firing on tobacco during curing. Studies conducted at several sites in southern Ontario show significant reduction of TSNA's in indirect firing versus direct firing systems. 40% of the tobacco kilns were converted to indirect firing this year. The plan is to complete the conversion of the remaining 60% by 2002.

4. Leaf chemistry

Leaf chemistry is an important aspect of CTRF research. Surveys conducted in the past two years identified the effect of the amount and timing of fertilizer nitrogen on tobacco leaf chemistry.

STATE OF THE INDUSTRY

YEAR	AREA	Yield	Market Production		Total value
	Acres	lb/ac	'000 lb	'000 kg	$'000
2001*	52,977	2.210	117.100	53,163	264,000
2000	55,000	1,925	106,422	48,273	244,278
1999	59,500	2,400	142,379	64,583	308,933
1998	65,500	2,300	150,576	68,300	326,525
1997	66,000	2,350	154,913	70,267	341,928
1996	66,930	2,200	142,241	64,519	317,896
1995	62,500	2,475	152,187	69,031	316,802
1994	57,260	2,300	129,621	58,795	271,476
1993	69,250	2,475	156,412	70,947	311,362
1992	63,500	1,825	131,101	59,466	265,870
1991	65,180	2,600	154,100	69,899	294,546
1990	64,000	1,950	123,230	55,896	243,009

*Forecast

Crop production and crop value for the year 2001 is higher than last year, but lower than most other years. In response to concerns of the tobacco industry, 40% of tobacco growers have replaced the conventional heating system "direct firing" to a new system called "indirect firing" when curing tobacco leaves. Studies show significant reduction in TSAN's when tobacco kilns are converted to indirect heating. The cost of converting a kiln is estimated between $5000 to $8000. This will probably result in considerable reduction on the number of tobacco growers.

The tobacco industry recognizes the need to improve tobacco quality in order to compete in a global market and continues to take a proactive role in grower education. The industry in cooperation with OMAFRA will, during the winter of 2001/02, present the most recent research information on tobacco production to growers in a series of workshops and winter meetings.

EMERGING ISSUES

1. Alternatives to soil fumigation

The tobacco industry is totally dependent on soil fumigation to control plant parasitic nematodes and the disease black root rot. Last year a new variety (CT681) resistant to black root rot was made available to tobacco farmers. This will reduce the use of the Chloropicrin (CP) containing fumigants in the farming system. A biological alternative to chemical fumigation for nematode control would also be of great value to the farmers.

2. Mechanical harvesting

Over the years, the number of tobacco growers is decreasing, in contrast however, the size of tobacco farms is increasing. Increasing farm size will add into the already existing labour shortage. Several tobacco growers have already shifted to mechanical harvesting and the trend shows that the number of growers acquiring mechanical harvesting is increasing, therefore, there is an urgent need to address this issue by modifying the currently available practices and producing varieties suitable for mechanical harvesting.

3. Balanced leaf chemistry

Leaf chemistry is influenced by several factors such as nitrogen, topping and cultivars. The tobacco breeding program has recently developed a new cultivar (CT157) with better leaf chemistry, however, crop management practices need particular attention in order to ensure a balanced leaf chemistry.

4. Withdrawal of Imperial Tobacco Leaf from tobacco advisory committee (TAC)

On November 19, 2001, Imperial Tobacco announced its withdrawal from TAC. The purpose of the TAC is to advise and make recommendations to its member organizations in respect to all matters relating to the production and marketing of tobacco. Its anticipated that the withdrawal of Imperial tobacco from TAC is linked to its support for a direct contract purchasing system.

Pest Management – Insects, Diseases, Nematodes

Emerging Pest Issues

Lindane.

PMRA is definitely going to pull lindane from the market place. This puts seed corn maggot and wireworm control in corn and beans in question. Lindane is the only option. After meeting with Wendy Sexsmith, we got the impression that PMRA would allow one more season of use. Helix, Cruiser and Gaucho are all viable alternatives for both pests, however, they are not currently registered on corn or soybeans. A minimum review of 18 months through PMRA for a minor use, would require us to submit a minor use application for at least one of these now to get registration in time for 2003. Jim Chaput is in charge of minor use for OMAFRA and OCPA and OSG should co-champion the application. We have data for both pests to support, but the big question is residue data. This application should fit the minor pest in major crop scenario and fall under URMULE.

European Chafer.

Areas affected still range in the thousands of hectares, but the infestation did not seem as bad in intensity as the year previous. Chafer populations were sporadic and unpredictable, in some cases high populations measured in the fall crashed over winter. There are no products registered for chafer in wheat and corn. Some progress in finding products has been made but a fully satisfactory solution is not yet available. Michigan and Ohio are reporting similar problems but not to the same extent that we have. When populations are high, tend to spread Milky spore disease, for which we saw some evidence in late summer with the rains finally arriving.

If the turf experience is any indication of how this pest will behave in field crops, this pest has serious cyclical potential for harm. The egg laying behaviour in soybeans needs to be studied to perhaps find a weakness for control. Other priorities included forecasting and sampling, threshold work – avoidance, efficacy work on insecticides as seed treatments or in-furrow applications. Little is known about cultural eg. tillage, delayed planting. A longer term approach might be biocontrol via Bacillus Biocontrol.

Soybean Aphids.

Aphids to varying degrees could be found in almost every soybean field in Ontario. Only those fields west of Toronto experienced economic loss. Rough estimates for those fields west of Toronto was that there was only half a soybean crop and half of that loss was attributed to aphids and half was attributed to the drought alone. Some estimates put the loss at about $50 million due to aphids. Certainly the two went hand in hand and there were other contributing factors to the losses such as soybean cyst nematode. Some fields that had adequate moisture had respectable yields despite the presence of high numbers of aphids. In hindsight under the drought it might have been useful to have sprayed more fields. However, under adequate moisture the US in 2000 (the first year of north American experience with this insect) showed little to no value to spraying. Another serious concern is the transmission of soybean mosaic viruses by these aphids. Indeed the prevalence of discoloured seed because

of SBMV was exceptionally high this year, by industry reports. Sooty mold was also prevalent on infested plants as a secondary problem to the aphids. Although it was obvious there was a yield impact due to sooty mold it was difficult to separate out the loss.

A consortium of public researchers is putting together a joint research proposal and action plan in Ontario. Several control options are being investigated. We have only one insecticide registered, dimethoate, an organophosphate. It is a troubling thought to have thousands of hectares treated with this material next year. Matador, a much safer option, is the next nearest contender but it would require a label extension taking a minimum of 18 mos. Seed treatments including the newer nicotinyls are being investigated. We do not know enough about how effective ladybugs are in aphid control and how they interact with insecticides.

Extensive **Stink bug** damage to food grade soybeans destined for Asian markets was also noted for the first time in Ontario. Up to 15-20% pick was noted this year in many beans samples. It is uncertain why they were a problem, but their high numbers were coincidental with the presence of aphids. Whether they were there because of the ladybugs and/or aphids is uncertain.

Bean Leaf Beetle

Only a few causes of this pest were noted this year, which is a drop from the previous year. Infestations seem to be related to survival after mild winters. The main concern is the potential for transmission of Bean Pod Mottle Virus. If it is found to vector this disease in Ontario then this pest will need to be controlled.

Grey Leaf Spot in corn

Reports of seed companies finding this disease this year were confirmed by AAFC, OMAFRA, U of Guelph. It was found at very low incidence. This disease has caused serious harm in the US corn belt. Tilt is in the publication already for this disease. Quadris minor use package for seed corn went in. The resistance of hybrids used in Ontario is questionable, because this disease was not a priority in breeding programs. Predictive measures need to be developed along with control thresholds.

Rust

same concerns as Grey Leaf Spot

Fusarium in wheat

Folicur is up for one more emergency registration. Application to go in February. PMRA is leaving some doors open for fast tracking a review in time for full or temporary registration in 2003.

Rhizoctonia/Pythium/Phytophthora complex

It was noted that these diseases are increasingly becoming a concern. An Ont. survey showed that Pythium was the most common disease this year. APRON seed treatment, and other products are applied commercially, by

certified seed producers. We don't have products for the grower to apply on farm, Only a small percentage of soybean seed is treated commercially. On farm treating is a more realistic objective for the companies to go for.

Western corn rootworm

There is some evidence that the soybean variant troubling Indiana/Illinois producers is in Ontario, but so far at a very low, non-economic level and frequency. It is still difficult to say if this new pest will become economic in Ontario.

Objectives for the Committee for 2001-2002

1. Folicur registration
2. Chemical options for Soybean Aphids
3. Sorting out impact, seed quality, pest complex of soybean aphids
4. Sort out resistance management strategy for new transgenics (i.e. CRW)
5. Stewart's Wilt/Flea Beetle management for seed corn
6. Keeping track of emerging and cyclic pest issues (i.e. aphids, chafer, grey leafspot, stewart's wilt, rust etc.)
7. Minor use applications
8. Revise Pub 812

Strategic Directions: Research

Recommendation 1

Agronomic Systems and Environmental Stewardship

Research leading to production systems and their components which enhance competitiveness, food quality and safety and environmental sustainability.

Successful field crop production requires the integration of many complex components. The target of high yields and high quality with low environmental impact while maintaining profitability is extremely difficult in biological – based systems which operate in global markets subject to political influences. The ability to integrate decisions on cultivar/hybrid with those on planting date, tillage system, row width, seeding rate, weed management, pest management, heat unit area, soil type and a host of others plus all of the interactions between these components requires solid reliable research information. Research not only on individual components of production systems but research on the integration of those components (systems approach). Thrown into the equation are the inevitable shifts in pressures from new pests (aphids, european chafer, western corn rootworm variant), expansion of old pests (SCN, fusarium) new weed species (problem weeds, herbicide-tolerant weeds), soil management concerns and new issues of carbon sequestration and reduction of greenhouse gases. Imposed on this background is the fundamental requirement to maintain a competitive industry.

The research priorities described below attempt to address these issues through both strategic, integrated approaches and individual targeted goals.

Specific Commodity / Discipline Based Priorities

1. Strategic Approach to Controlling Field Crop Pests – Field Crop Pest Management Committee:

The following list of field crop pests are placed in order of priority in terms of research needs. Strategies differ for each pest and include management, chemical controls, breeding, economic thresholds and pest biology. In most cases no single approach is warranted, but rather an integrated long-term strategy involving several approaches is advised. This should involve collaborative work with pathologists, entomologists, breeders and agronomists.

Soybean Aphid: Economic impact (thresholds), Management, Chemical controls, efficacy and non-targets, Plant breeding, Biology, life cycle, overwintering, sooty mould relationship, Relationship with other insects, Vectoring viruses

European Chafer: Decision Thresholds, Scouting monitoring predicting, Biology, Control measures, Chemical, Cultural, Biological

Fusarium: include economic impact statement when sending this to FCRSC and OPMRSC. Resistance breeding, New chemistry, Grading system wheat- inconsistent

Soybean Cyst Nematode: Population dynamics -Race shifts, Spread of SCN, Management

Corn Rootworm: Risk assessment for soybean variant in Ontario

White Mould: Resistance, Management - New products to replace lost Chemicals

Root Rots (Pythium, Phytophthora, Rhizoctonia, Fusarium), Thresholds, Better management tools Biology

Corn Stalk Rots (Anthracnose, Fusarium, Gibberella) Implications of cropping systems to disease, Management

2. Greater Energy and Environmental Efficiencies – Ontario Corn Committee

Increasing energy use efficiency is critical to the health of the corn industry in Ontario. Specifically, research must continue to result in improved nitrogen use and grain drying efficiencies.

Nitrogen fertilizer represents a major input cost in corn production, is a significant component in many animal manures, and has the potential to adversely affect the quality of surface water and groundwater. Cropping system research must take an integrated approach to combine tillage, crop rotations, cover crops, manure management, soil testing, site specific technology, etc. to enhance productivity while protecting the environment.

Grain drying costs represent a competitive disadvantage to the corn industry in Ontario compared to many other jurisdictions. Research must continue to develop grain drying systems that represent reasonable capital investments while significantly improving energy use efficiencies.

3. Develop management strategies for emerging problem weeds that will be sustainable in the long term. Ontario Weed Committee

The Issue:

Profound and dramatic changes have occurred in cropping systems across Ontario over the past decades. The increasing adoption of conservation tillage practices and the introduction of new herbicide technologies have caused the emergence of new weed problems. In most cases, the "new" species take over niches left open or created following changes in tillage and/or weed management practices. Problem weeds are very often perennials

although spring and winter annuals are also encountered. These species are challenging for growers, as they are often not covered by herbicide labels.

Current Research/Extension Activities:

Current research adequately assesses which herbicides are effective on specific weed species. Research on many problem weed species has been conducted or is currently being done at the Ridgetown Campus and the Main Campus of the University of Guelph, and at AAFC Harrow. The following table indicates the weed species and the locations where research takes place.

Species	Guelph	Ridgetown	Harrow
Annual sow thistle		√	
Beggarticks		√	
Bur cucumber		√	
Canada fleabane	√	√	√
Canada thistle		√	
Cocklebur		√	
Common chickweed		√	√
Crabgrass		√	
Dandelion		√	√
Eastern black nightshade			√
Goldenrod		√	
Field horsetail.		√	
Field violet	√	√	
Horsenettle		√	
Perennial sow thistle		√	
Prickly lettuce		√	√
Proso millet		√	
Quackgrass	√		
Red top		√	
Sandbur		√	√
Spreading atriplex		√	
Swamp smartweed		√	
Three seeded mercury	√	√	
Tufted vetch	√		
Volunteer corn	√	√	√
Volunteer hemp		√	
Wirestem muhly		√	

Gaps/Barriers/Deficiencies

As such, the information generated is very useful for end-users. It is necessary however to find means to effectively channel the information to end-users while taking into account he limitations imposed by herbicide labels.

Nevertheless, there is a need to develop a database on the best ways to control these species in the major field crops of Ontario. Although herbicides would be the management tools of choice, strategies should not be exclusive and should encompass other approaches such as mechanical and cultural. Management strategies should aim at developing long-term solutions and avoid short-term "Band-Aid" approaches that could create further problems. This means that the biology of the problem weeds should be the aim of those studies at its understanding forms the base of long-term, integrated solutions
This type of information is lacking for most of those species. The fact that, as a whole, weed management in Ontario is rapidly evolving needs to be taken into account. The availability of technologies such as Roundup-Ready and Liberty Link can bring solutions, but can also be the source of new concerns. While herbicides such as glyphosate, glufosinate and others can provide adequate control of problem weeds, care should be taken to avoid overuse so the mistakes of the past are not repeated.

4. Development of Integrated Weed Management (IWM) systems for field crops. Ontario Weed Committee

The issue

Past experience in Ontario and elsewhere has proven that reliance on herbicides as the sole means to control weeds can cause problems such as the development of resistance, shifts of weed community composition, over-application of herbicides, and accumulation of residues in the soil. IWM systems aim at reducing the negative effects of weed management, preserving efficiency in weed management while taking into account environmental and societal needs.

IWM works by destabilizing weed populations and shifting the weed-crop interference equilibrium in favour of the crop so as to maximize yields and quality. Herbicides are integral parts of IWM systems along with cultural, mechanical and biological methods. Yet, IWM does not simply mean mixing different methods together in the hope that better results will ensue. IWM needs not be reactive to problems but rather predictive and proactive. Knowledge of weed thresholds, critical periods of interference, weed germination/emergence patterns, etc., are biological information that is critical for IWM systems.

Current Research/Extension Activity

Research on modeling of weed emergence is currently being conducted at the University of Guelph. Evaluation of the effect of row width, crop density and tillage management on weed seed predation is done at the University of Guelph. Experiments on critical period of interference in no-till soybeans are conducted at AAFC Harrow. Research on the effect of weed threshold based decision support systems is being conducted as a joint effort between AAFC Harrow, University of Guelph Ridgetown and Guelph campuses.

Gaps/Barriers/Deficiency

More long term studies, comparing different approaches to IWM so as to demonstrate/prove their effectiveness, are needed. Limitation in funding for long term research is a severe problem for that type of research.

5. Developing sustainable soybean production systems – Ontario Oil and Protein Seed Crop Committee.

Significant improvements have been made in the yield potential of soybean varieties. This improvement has been made with little attention to changes in production practices. Research is required on production systems involving improved varieties. Environmental pressures are shifting production practices towards minimal application of herbicides, fertilizers, or pesticides. Reduced tillage could result in a 30-35% savings in land preparation costs and narrow rows may increase yields 5-10%.

Background: Over the past 15 years significant changes have occurred in Ontario soybean production practices. Four of the principal trends are as follows:

1. Increased acreage- The total soybean acreage planted has increased significantly over the past 15 years. This resulted from expansion of the soybean producing area in the north and east and reduced rotation in traditional growing areas.

2. Narrower rows- Soybeans were traditionally grown in 30 inch rows but the majority of soybeans within the province are now grown at a variety of row widths below 25 inches. Narrow rows affect the climate within the crop canopy and can have an effect on weed populations and foliar and root diseases.

3. Reduced tillage- Soybeans are readily adapted to a variety of tillage practices. The development of no-till seed drills has facilitated reduced tillage for soybeans especially in the shorter season areas of the province. Production difficulties have occurred with reduced tillage on fine textured soils. The causes of these difficulties have not been identified. Soil structure, soil moisture, and plant diseases may be factors.

4. Reduced rotation - Soybeans are included more frequently in crop rotations especially in southwestern Ontario. The effect of this practice on soil structure, fertility, weeds and diseases requires additional research.

6. Agronomic Technologies and Environmental Impact – Ontario Cereal Crop Committee

Background: Research developing and evaluating new agronomic techniques is essential to determine strategies which will maximize returns for growers and processors, yet minimize or remove any environmental impact. These technologies are far ranging in nature, from fertilizer rates, placement, and timing to tillage techniques. This is a high priority for public funding as there is little impetus or benefit for private research in this area.

Where appropriate, environmental aspects of these technologies should be an integral part of the research undertaken. An excellent example of this type of research would be the investigation of nitrogen rates for higher protein wheat production. The research could determine appropriate nitrogen rates, predictive tools like the nitrogen soil test, use of combine protein monitors, value to the end user, and also investigate any environmental impacts on groundwater.

Economic importance: The cost of tillage and other inputs makes up a large part of the cost of production of cereal crops. Reduction of these costs, or increased efficiencies of inputs, would have a positive economic impact on all producers.

Competitiveness: Increased efficiencies or reduced costs will allow the industry to be more competitive.

Environmental: Targeted applications and increased efficiencies will reduce environmental impact of agronomic practices that are investigated.

6. Managing Climatic-related Risk in Perennial Forage Crops – Ontario Forage Crops Committee

I) Genetic/Biotechnology Improvements with respect to winter survival

II) Develop management techniques for improved winter survival of conventional and genetically altered alfalfa, and develop management techniques to enhance production of grasses during drought conditions.

Background:
Perennial forages occupy more farmland than any other crop in Ontario. They provide the feed base for virtually all dairy, beef, sheep, goat and horses farms. Winterkill can range from no significance to severe losses in all areas of Ontario. Clearly variety selection and management have a resounding influence yet producers are still concerned and always fear another bad winter will result in a shortage of hay and higher prices. Since a secure supply of forage is critical to the operation of these industries, the OFCC feels that researchers have to concentrate more effort on methods to ensure that forage supply will be adequate.

Forage and livestock producers have stated quite clearly that climate related issues, especially winter kill of alfalfa are their number one concern. Genetic progress in alfalfa over the past 20 years has focussed on disease resistance, increased yields and improved quality. However, specific efforts are required by conventional or biotechnology means to improve winter hardiness of alfalfa without deterring from other traits, especially yield, that have been improved in the past. To complement this work, improvements in the winter hardiness of orchard grass should be made, since this grass is increasing in use with alfalfa and is the key grass species used in sown pastures in much of the province.

In addition to genetic improvements, producers want management techniques that improve the continuity of forage supply over the growing season. This would include techniques in pasture management to even forage supply during spring and summer, cope with dry weather and extend the grazing season in the fall. Certain annual forage crops have potential to produce pasture or stored forage when the growth of perennial forages is reduced by drought or the onset of autumn. For stored forages, efforts should be concentrated on ensuring that management techniques are properly matched with the needs of new genetic material introduced into the marketplace. When new traits are introduced to alfalfa or other species, the management package may need to be re-evaluated. In other cases, what is considered normal management may need to change to better ensure winter survival of currently used varieties.

The OFCC recommends that research be directed at ensuring the security and continuity of forage supply with respect to climate related risk through improved genetics and management practices.

8. The management/impact of herbicide tolerant crops in a sustainable cropping system – Ontario Oil and Protein Seed Crop Committee

The uptake by producers in growing herbicide tolerant crops is phenomenal. Along with this technology come concerns with weed resistance, weed population shifts, and control of herbicide tolerant volunteer plants in following crops.

Background:

It is estimated that 50% of the soybean acres in Ontario this year will be tolerant to glyphosate.
Herbicide resistance has been identified in overuse of other herbicide groups (notably group II resistant weeds in soybeans)
Continued use of 1 herbicide in a relatively narrow application window may lead to shifts in weed populations within a species (ie. late emerging vs. early emerging by herbicide solution.
Growing herbicide tolerant crops decreases the available options in controlling volunteer plants in succeeding crops (ie. cannot remove RR canola out of RR beans with Roundup)
The concerns with overuse of 1 herbicide group in a cropping system with all crops tolerant to that herbicide group.
Some weed escapes adversely affect the quality of the harvested crop (ie. nightshade staining in soybeans). This is of particular concern in the food grade market.

9. Sustainable Production Systems - Ontario Pulse Committee

Issue Development of agronomic Practices that utilize innovative technologies, enhance sustainable production and exploit the yield potential of new cultivars. Agronomic reasearch is also focusing on practices that enhance food quality and food safety.

Details

Research is required to maximize production with less tillage, narrow rows, cover crops, and minimum herbicide, fertilizer , and pesticide. Reduced tillage could result in a 30-40% savings in land preparation cost. Further work on nitrogen management options need to be explored. The market place is placing increasing emphasis on food quality and food safety issues requiring research and field evaluation of practices that influence these.

Background

One theme during the past several years of research has focused on seed quality and food safety. Mechanical damage study work has been carried out to genetic differences in susceptibility to mechanical damage. Research and extension has also evaluatied how desciants influence yield, and quality of edible bean seed. Furthur research into agronomic pratices and their influence on seed quality and safety is required. Edible beans, particularly coloured beans are grown in wide rows using conventional tillage with the result that plant growth may only cover the soil for two months out of the year. Reduced/no-till options need to be further explored to improve sustainable production. In addition, earlier research trials have shown mixed results with nitrogen fertilizer. However, growers often report an advantage in applying 40-80 lbs./acre of nitrogen. Nitrogen management needs to be further

explored including, N soil testing system, and use of inoculants to minimize potential for enviornmental loading.

Research Recommendation. Important, further funding required.

10. Forage Preservation and Storage – Ontario Forage Crops Committee

Forages in Ontario are either made into stored feed as dry hay, silage, or grazed. In stored feed systems, many losses occur from the standing crop to offering the stored feed to the animal. Attempts to minimize these losses have been the subject of previous research projects in Ontario and elsewhere. New efforts in equipment design may further reduce losses during forage preservation.

The goal of making "hay in a day" has been expressed by commercial hay producers. Such a system might incorporate hay maceration plus preservatives, or microwave hay drying. Hay maceration is being studied in Quebec and in western Canada, while work on preservatives is widespread, although mostly in the private sector.

In the area of storage, much knowledge is available and extension is likely the key to progress in this area.

11. Forages and the Environment - Ontario Forage Crops Committee

Forages are generally quite beneficial to the environment. Studies in the past have shown improvements in soil structure, reduced soil erosion, and less runoff from fields with a perennial forage cover. New issues have arisen which need to be addressed. The use of forages as buffer strips along watercourses is common, but it is unclear what type of forage works the best or how large the buffer should be. The use of forages as a crop to store carbon in the soil is also an issue that seems likely to increase in prominence over the next few years. As the concept of full accounting gains prominence (including indirect costs of a practice or activity), the beneficial nature of forage crops on the soil, water and air could increase their value in modern crop production systems.

Another societal benefit associated with forages is the value of having livestock grazing pastures. In some parts of Europe, farmers are paid to maintain livestock on certain pastures because it increases the value of the area for tourism. While outside the scope of the OASCC system, it is reasonable that we should acknowledge the non-agricultural value of grazing livestock in the same way that we acknowledge the value of forages for soil quality and carbon sequestration.

A potential negative association between forages and the environment is the large volume of waste plastic that is generated each year from wrapped or bagged silage. It is imperative that more effort is put into recycling waste silage plastic or into creating biodegradable or photodegradable plastics that will not require land filling.

12. Weed Management in Forage Crops – Ontario Forage Crops Committee

Background:

As in any crop, weeds are ubiquitous in forages. During the life of a forage stand, weeds can reduce yields, affect hay drying and reduce palatability. Weeds such as witchgrass in timothy or black medick in birdsfoot trefoil and red clover fields grown for seed can make seed cleaning difficult which affects the acceptability and quality of the seed. In pastures, weeds that invade the desired forages limit productivity and carrying capacity. As well, some weeds in pastures may lower animal productivity due to toxic compounds, prickles that scratch the throats of grazing animals, weeds that impart foul odour or taste to milk and structures like burrs that cling to wool. Weed management is an integral part of overall crop management because weeds have a profound effect on productivity and feeding value. The importance of weeds in forage management is such that it needs to be specifically addressed. Forage producers are concerned with controlling the annual broadleaf and grass weeds at establishment that can impede successful implantation of the stand. Another issue of major importance is control of perennial weeds such as dandelion, quackgrass, smooth bedstraw and Canada thistle. Weed management has an impact on several other areas deemed as priorities such as yield, environmental benefits, forage crop longevity, feeding value and grading system.

Research needs: Research efforts must continue to address the effects of weeds on yield, stand longevity and forage feeding value. The environmental impact of various weed management methods for forage crops should be assessed. In addition to investigating weed management in forages, work should also be conducted on using forages as a weed management option.

The problem of weeds at stand emergence still needs to be addressed. Some of the commonly used broadleaf herbicide products restrict grazing or feeding of the forage in the year of treatment. The manufacturers are working toward removing that restriction. New formulations of products are currently under test and should continue to be monitored.

New products, tank mixes, adjuvants, rates and application methods must continue to be evaluated to provide forage producers with as many options as possible to control weeds at all stages in the life of a stand.
Continued investigation is needed into integrated approaches to weed control in hay, pasture and seed crops focussing on cultural, mechanical and chemical methods. Additionally, the role of forage species, mixtures, varieties, seeding rates and dates as means of cultural control is necessary given the expanding uses for forage crops and the introduction of new forage species.

Using forages as cover crops, inter-crops and living mulches in other crop and non-crop situations is another aspect of weed management that would promote work on forage varieties and environmental benefits.
The effects of weeds on forage feeding value in terms of nutrients and palatability should be assessed.
Identification of new emerging weed problems in forages, their impact on productivity and options for their management is important.

13. Evaluate effectiveness of new herbicides to assist registration and provide information on environmental impact - Ontario Weed Committee

The issue

The introduction of new herbicides by agrochemical companies has been increasingly difficult over the past decades. This is due to increased R&D costs, increasing stringency in registration requirements and depressed

value in the agricultural sector. It is therefore of prime importance that any potential new herbicide is widely tested across the province and that this testing is not conducted only by the companies developing the products. The fact that some of the data that supports registration is obtained at arms length form the companies can be a reassurance for end-users that the information is as correct as can be.

Current Research/Extension Activity
Research on the evaluation of new herbicides is on-going at the University of Guelph (Guelph, Kemptville, Ridgetown) and AAFC Harrow.

Gaps/Barriers/Deficiency
Most of the research that is conducted by the public sector is sponsored by agrochemical companies. They will look for specific use patterns as dictated by registration requirements and forecasted market placement. Independent assessment allows for the examination of use patterns of interest that might be overlooked by the companies.

14. Soil Fertility/Soil Quality/Soil Management – Ontario Oil and Protein Seed Crop Committee

Issue: Optimizing crop production while protecting soil and water quality

Residual fertilizer P has been increasingly become a concern as to farmers' return and the impact on water quality. Continuous fertilization with an use efficiency as low as 15-20% in the year of application has resulted in large accumulation of phosphorus (P) in soil. In Ontario, about 60% of soils for agricultural production is with high or excessive soil test P levels. Further, adoption of reduced tillage, especially the no-tillage practices, has resulted in stratification of phosphorus and potassium, which are predominately staying in the surface soil layer. This distribution pattern of nutrients induce roots mainly located in the surface layers, and thus decrease the resistance of crops to the adverse conditions, such as periodical drought. Values of residual P and K need crucially to be determined and innovative fertilizer P and K application method need to be developed and evaluated. Very limited study on residual K effect was done in the U. of G, which has been unfortunately almost discontinued. No research is going on phosphorus as to the issue mentioned above.

With the increased phosphorus level in soil, no-point source pollution from agricultural soils has been a concern on water quality. Knowledge gap exists as to the effects of soil phosphorus management needs to be filled. Some studies have been done in Quebec, which, however, in Ontario is very minimal or close to nil. Soils with high or excessive soil test phosphorus levels are with a larger area in Ontario (60%) than in Quebec (44%). Data shortage has built up significant obstacles for the implementation of the nutrient management plan.

During the past several years, a significant body of medical research has recognized soybeans as having a potential role in the prevention and treatment of chronic diseases (cancer, heart disease, kidney disease, osteoporosis). These effects have been attributed to photochemical called isoflavones, which are present naturally in soybeans and soy products. Recent preliminary studies at GPCRC, AAFC, Harrow, have uncovered that there are substantial differences in isoflavone levels in some Ontario soybean varieties, which are significantly affected by the

application of fertilizer phosphorus and potassium. The best soil fertility management practices have to be developed in association with varieties, if quality soybeans are to be produced and farmers' profits maximized.

15. Reducing Production Risks - Ontario Cereal Crops Committee

Background: Control of risk factors is critical to ensure a stable supply of sufficient quantity and quality of cereal crops. Factors such as winterkill, fusarium, sprouting, rust and other problems can cause havoc with both quantity of product available, and quality to meet market requirements. Techniques and strategies to overcome or manage these risks would have a huge positive impact on the stability of the industry.

Examples of research which fits in this category is the development of the fusarium prediction model, the rust monitoring model, improved winterhardiness techniques, and others.

Economic impact: Risk factors are responsible for many of the critical situations that occur in cereals. If techniques can be developed to overcome these risk factors, the added stability of supply should have huge economic benefits, not only to producers but throughout the processing sector.

Competitiveness: Consistent supply of quality product will allow the sector to out compete other competing jurisdictions.

Social benefit: Consistent supply will allow stability for jobs involved with the sector.

16. Determine weed specific postemergence herbicide rates and critical factors affecting their performance. Ontario Weed Committee

The Issue

There is a perception that herbicide label rates are sometimes too high than what should be required to obtain adequate control on specific weed species. Requirement for herbicide labels include a built-in safety factor that takes into account wide weed spectrum (a range of different species) and variable environmental conditions. The fact is that herbicide doses could be tailored so as to take into account the susceptibility of specific species. In many instances that tailoring would result in significant reduction from the label rate, without sacrificing efficacy. This information will help growers minimize herbicide use by adjusting the dose to the particular weed problem.

Current Research/Extension Activity

Work on weed specific postemergence herbicide rates for corn and soybean s is currently being done at AAFC Harrow. Related work on herbicide rates in corn is conducted at the main campus of the University of Guelph.

Gaps/Barriers/Deficiencies.

Such data will be inherently variable and this variability will need to be assessed before recommendations are to be made. Variability comes from two main sources:

1: the fact that environmental conditions have a strong impact on herbicide performance, especially when doses are reduced;
2: there is variability among weed populations across the province that warrants this type of investigation to be conducted on a larger scale.
The above mentioned sources of variability need to be documented further.

17. Construct a database of herbicide use histories/patterns and occurrences of herbicide resistance in Ontario to aid in the development of resistance management guidelines. Ontario Weed Committee

The Issue

Resistance to Group 2 herbicides (ALS inhibitors) is rapidly developing in weeds in Ontario. It has appeared in 1997 in green and redroot pigweed and has been confirmed in 2000-01 in Eastern black nightshade and common ragweed. Group 2 herbicides comprise the sulfonylureas (thifensulfuron, Classic), the imidazolinones (imazethapyr, Pursuit) and the triazolopyrimidines (flumetsulam, Broadstrike). These herbicides have favorable features such as low mammalian toxicity, low use rate, good crop safety and high weed control efficacy. Resistance renders these herbicide(s) inefficient on the affected weed populations and very often force farmers to resort to re-spray programs. Eventually, this may force growers to use alternative herbicides with less favorable characteristics.

Research/Extension Activity

Research is being conducted at the University of Guelph (Guelph campus) on characterizing resistance in green pigweed, redroot pigweed, Eastern black nightshade and common ragweed.
The Herbicide Resistance Subcommittee of OWC is currently devising recommendations for the management of resistance that are based on current research information.

Gaps/Barriers/Deficiencies

Eastern black nightshade and common ragweed need to be further characterized so that alternative herbicides can be identified.

Farmers and consultant need to be able to rapidly identify resistance through the use of reliable diagnostic tests. Rapid confirmation eliminates second-guessing and allows early planning of management strategies. It also allows for the identification of reliable alternative herbicides, preventing the costly use of inefficient rescue treatments.

The link between resistance and potential fitness penalties associated with it need to be investigated further. What is the effect of resistance when alternative herbicides are used? Would resistance genes affect survival in the seed bank? This need to be determined on a weed specific basis so as to help in the better design of management programs.

There is a need for the development of comprehensive management tactics to deal with resistance and to prevent its occurrence. Ideally these should be based on the adoption of Integrated Weed Management programs that would proactively target weed problems and not just react to the occurrence of resistant populations.

18. Develop and evaluate site-specific methods of weed management as a means of reducing weed control costs and/or improving efficiency - Ontario Weed Committee

The Issue

Site-specific weed management targets only those areas of fields where weed problems occur with an emphasis on weeds with patchy distributions. It has been shown that it is possible to effectively target weed patches thereby reducing herbicide use by up to 60%.

Research/Extension Activity

Research is currently done at the main campus of the University of Guelph for the development of a sprayer capable of detecting weeds and triggering herbicide application.

Gaps/Barriers/Deficiencies

A major barrier preventing the adoption of this approach is the difficulty in obtaining precise and reliable weed maps in a quick and inexpensive manner. Remote sensing technology is seen as potentially being able to provide this kind of information, but we need to understand the limitations of this technology. More importantly we need to determine what resolution needs to be achieved in the detection of weeds.

As this approach target weed patches, we need to increase our understanding of weed patchiness. Why are weeds patchy? Are patches stable, allowing maps to be reused over the years? Can we predict patch expansion? What is the effect of targeting patches on the overall field dynamics? What would happen to weed threshold if patches are targeted? These are only few of the questions that need to be answered so that the technology that will be used will be based on sound biological principles.

19. Determine the effect of varying nitrogen rates in corn on weed competitive ability, weed seed germination patterns and the effectiveness of control measures on species such as foxtails, barnyard grass, pigweeds, lambsquarters and common ragweed - Ontario Weed Committee

The Issue

It is very likely that government regulations will impose limits on the amount of N fertilisers farmers will be allowed to put on crops, especially on coarser textured soil. As N is the nutrients for which weeds compete the most with corn. Therefore a reduction in fertiliser levels may negatively impact on the outcome of the weed-corn competition, to the disadvantage of the crop. This may, as a result, mean that weed control measures need to be intensified. The effect of reducing N levels on the ability of crops to withstand competition deserves to be looked at.

Research/Extension Activity

Research is done at the main campus of the University of Guelph to investigate the effect on N level on the competitive ability of green foxtail and corn

Gaps/Barriers/Deficiencies

No research is currently done to study the effect of varying N level on the competitiveness of other species such as common ragweed, lambsquarters, pigweeds, and barnyardgrass

20. Integrated Pest Management for Insects and Disease - Ontario Pulse Research and Services Committee

Details Leafhoppers are important insect in edible beans for which up to 3 applications are required for control in a season. Research work conducted by Ridgetown College, University of Guelph with seed treatments indicate excellent early season control, which may replace/reduce the need for sprays. Differences in tolerance/resistance factors of various bean types need to be investigated. Research/extension efforts are required to develop IPM program

Registration of a new seed treatment, Maxim – Apron on edible beans has been submitted for very early season control of root rot organisms. Registration of this product will allow freer trade of edible bean seed between Canada and the USA, where this seed treatment is already registered. Further research is required with seed treatments including biological products along with agronomic practices to manage root rot.

Background

Evaluation of New Seed Treatments for Root Rot

This research was initiated in 1998, and the primary focus is to identify new seed treatment products that provide better visual control of root rot, and provide a significant yield increase, compared to control treatments. In 2000, several new seed treatments were tested. As well, the seed treatments were tested for the control of seed borne anthracnose, in a greenhouse study. In the field studies in 2001, emergence and root rot varied with location, in part due to varying levels of root rot organisms. This year a new method of inoculating plots with root rot organisms within plots appears to be quite effective. Further investigation of this methodology is required. Most seed treatments improved emergence compared with the checks. Limited testing with several biological products including bacillus subtillus show varying levels of control.

Evaluation of New Seed Treatments for Leafhoppers

A combination of higher leafhopper pressure in recent years, and greater grower awareness of leafhopper damage has resulted in an increase in spraying to control leafhoppers in edible bean crops. Most growers that monitor their fields closely find that they spray as many as three times each crop year. It was felt that some of the new insecticide seed treatments may provide some residual control of leafhoppers, with would reduce the need to spray. After 2 years of trials, the initial data suggests that leafhopper nymph populations can be kept below an economic threshold for up to 6 weeks after planting. In some cases yields where seed treatment was used were up to double that of the non-treated check. Cost of the seed treatments are less that ½ of the cost of one pass of field spraying. In 2001, another project was initiated to investigate other agronomic practices to manage leafhoppers. One bean type, Burma is very susceptible to leafhoppers, but showed limited value as a trap crop when planted next to other bean types.

Research Recommendation Important, continue funding at existing level

21. Winter Canola Development – Ontario Oil and Protein Seed Crop Committee

Issue: Developing Winter Canola for Ontario

Improving the productivity of canola in Ontario requires research in the following areas:

1. Ontario growers need a program develops improved varieties and also which identifies the best hybrids and varieties coming from Western Canada, Ontario, and other countries.
2. Agronomic studies to determine nutrient requirements, efficient tillage systems, cropping systems, and varietal response to no-till.
3. Controls to reduce damage from insects (flea beetles) and disease (black leg, Alternaria and white mould).
4. Increase winter hardiness of winter canola.

Background: The spring canola crop is worth $12 million per year in Ontario. The prospect of inexpensive , broad-spectrum weed control, higher yielding varieties, $400/tonne prices and an available market make this an attractive cash crop for the short-season areas of Ontario in which growers have few cash crop options. However, canola has had little agronomic research in Ontario. Studies designed to: i) determine the nutrient requirements of high yielding requirements hybrids, ii) test more efficient planting systems such as no-till and iii) varietal response to no-till, iv) develop methods of controlling damage from flea beetles and Sclerotinia. In 1996, herbicide-tolerant canola varieties were available, yet little Ontario research has been done on cropping systems. Some data suggests that a glufosinate-tolerant variety is very susceptible to Alternaria. This could cause major problems if this variety is grown in the presence of the disease of the disease. Research is also needed to pinpoint when canola should be sprayed to maximize weed control, and yet not miss late-emerging weeds.

There is also a major need to extend the winter hardiness of winter canola. This likely means incorporating transgenic characteristics. If the crop would survive across southern Ontario, it offers 30% higher yields than spring canola, over winter erosion protection, a better distribution of seasonal workload for the growers, better canola quality, and harvesting in July.

Recommendation 2

Innovative and Enhanced Germplasm Development and Utilization.

This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.

The research described within this recommendation strives to develop the raw materials and the knowledge base leading to a vibrant and diverse field crop sector. It includes breeding for increased competitiveness, new markets, life-science based products and processes and improved quality. It includes basic research in the areas of genomics and bioinformatics to discover new applications and uses, to increase efficiencies of breeding systems and to dramatically broaden the utility of basic commodities. The overall goal is to produce new, higher value products for the industry and to do it quickly and more efficiently. The priorities listed also include research programs in the area of crop and plant physiology and document strong support for enhanced performance testing systems.

1. Breeding for yield and production stability – Ontario Oil and Protein Seed Crop Committee

Issue: Maintaining competitiveness in international soybean commodity markets.

Soybean is an extremely important field crop in Ontario with an economic farm gate value in excess of $500 million/year. Plant breeding results in significant increases in productivity and economic gain, without significant increases in production inputs. In Ontario, for each 1% gain in yield potential, farm gate value increases by over $6 million at current acreages (2.1 million), and average price ($7.50/bu) and yield (38 bu/ac).

Background: Soybean productivity in Ontario is increasing at approximately 1.5%/year due to improved cultivars and superior production techniques. At this rate of increase, the soybean crop will be worth $696 million (in farm gate receipts) at the end of a 10-yr period. This is a farm gate payback of over $500 million over this 10-year period! Maintaining the current rate of gain will require a greater contribution from plant breeding. The amount of emphasis that can be allocated to breeding for yield depends upon the number of other traits that must be considered. Breeding for resistance to soybean cyst nematode and white mould and breeding for specific end-uses, such as food quality for export markets (tofu, natto, soymilk, miso) and in value-added fatty acid profiles in the oil is also important to Ontario soybean production. Emphasis on breeding for other targets will pressure the gains that can be achieved in increasing the yield potential. Resources must be maintained or enhanced in breeding for yield to maintain the current rate of yield gain. With a reduction of just 0.5%/year the Ontario producers would lose more than $130 million over the next 10 years and using the 5:1 multiplier ratio, the entire soybean industry $650 million less.

2. Genetic Improvement of Corn for Ontario – Ontario Corn Committee

The existence of an efficient continuum from inbred development through to commercial hybrid evaluation is critical to the Ontario corn industry. Elite germplasm may be developed to increase productivity, meet specific needs of a bio-based industry, or to confer nutritional improvements. However, these advances will have little impact on the provincial economy unless a system exists for ensuring that these advances can be integrated, refined and tested across Ontario.

Many of the priorities for the corn industry depend upon the successful incorporation of genetic traits, natural or modified, into superior breeding lines (e.g. cold tolerance, pest resistance, premium market traits, etc.) Although there are large hybrid development programs in the private sector, inbred/hybrid development must also continue to be part of the public breeding programs, since it is only through locally adapted germplasm that the true value of genetic enhancements to corn growers can be properly evaluated.

Within Ontario these public programs are important sources of "early" germplasm to be fed into the private sector breeding programs and they serve as the backbone for identifying the most efficient commercial hybrids.

3. Enhanced Pest Resistance in Corn - Ontario Corn Committee

Fusarium

Corn grown in Ontario continues to be prone, periodically, to severe infection by Fusarium ear rots. The toxins produced by these moulds seriously affect the performance and health of hogs, in particular, and may also affect the performance and/or health of other livestock, and humans. Livestock feeds still represent the greatest usage of corn in Ontario and the usage of corn for human consumption is increasing. Thus, high priority must continue to be given to the development of corn lines with resistance to Fusarium ear rots.

Work at ECORC and University of Guelph have investigated the mechanisms of ear rot infection and identified sources of resistance. Continuing funding is needed, however, to assist with the incorporation of genes for resistance into breeding lines and then into commercial breeding material, using both conventional breeding methods and biotechnology.

Leaf Diseases

In recent years there has been a substantial increase in the use of cultural practices that leave higher levels of crop residues on the soil surface throughout the winter and subsequent growing season. The presence of corn residues on or near the soil surface increase the risk and/or severity of infection from various fungal leaf diseases, such as eyespot, leaf blights and rust. In addition, leaf diseases not currently present in Ontario are threatening to move into this province from adjacent States in the USA. Hybrids currently grown in Ontario may have little resistance to these diseases.

Sources of genetic resistance to leaf diseases need to be identified and rapidly incorporated into superior inbred lines, using both traditional breeding methods and biotechnology. Success of this breeding effort and the prevention of devastating disease infestations will require the support of a plant pathologist with expertise in corn diseases.

4. Development of biotechnology tools for use in breeding and to provide understanding of genetic control of traits – Ontario Oil and Protein Seed Crop Committee.

Issue: New tools must be developed to understand and assist in breeding for complex traits

Biotechnology and genomics research offers new opportunities for soybean crop improvement. Conventional breeding programs and the processing/distribution chain will increasingly rely on molecular markers for selection of complex traits, for stacking multiple traits especially disease resistance genes, as well as for cultivar identification. The following are priority areas in molecular mapping, structural and functional genomics:

a) mapping of qualitative and quantitative traits using DNA markers
b) determining gene function and identifying novel genes
c) determining the structure and organization of the soybean genome

Background

The current explosion of DNA sequence information coupled with recent advances in molecular-based technologies offer new opportunities for soybean improvement. Large, publicly available databases of soybean

DNA sequences, in the form of 'expressed sequence tags' (ESTs) and full length cDNA sequence, are new and powerful resources for identifying genes that determine traits. Presently, a limitation restricting the use of marker assisted selection in breeding programs is that the function of most genes and their relationship to agronomic traits remains unknown. There is also a need for more precise genetic maps with a greater density of DNA markers. Thus, it is a priority to develop high resolution genetic and physical maps of the soybean genome and to link genes to discrete functions and traits. Developing and maintaining recombinant inbred populations segregating for specific traits, and screening for germplasm diversity provide resources for gene discovery. Creating cDNA and genomic BAC (bacterial artificial chromosome) libraries, assembling sets of unique expressed genes, constructing gene microarrays, and undertaking large-scale automated sequencing of DNA represent important enabling technologies for gene identification.

5. Improved Cold Tolerance in Corn – Ontario Corn Committee

This research area is key to enhancing competitive advantages for Ontario corn production as US based breeding programs have less interest in the genetics or physiology of cold tolerance.

There is a distinct need to develop reliable techniques to assess tolerance of corn hybrids/inbreds to chilling during grain filling, and determine if chilling tolerance during grain filling is correlated to early season cold tolerance.

More information is required regarding the conditions that limit corn growth, germplasm that will prosper in cool conditions, and the relationships that exist between traits that provide superior performance under both warm and cool conditions.

Ultimately, the goal is to incorporate superior cold tolerance into superior lines in corn breeding programs.

6. Improving Feeding Value of Forages for Stored Feed and Pasture – Ontario Forage Crops Committee

I) Genetic/biotechnology improvements to energy content and/or other desirable quality traits.

II) Management of forage crops to optimise feeding potential

Background:

High quality forage is the engine that drives the dairy industry in Ontario. Similarly, the beef and sheep industries rely to a great extent on high quality pasture and hay to ensure both milk production and proper rebreeding. Efforts to increase quality in both stored feed and pasture must be made to ensure that increased animal performance can be achieved from forages.

Alfalfa is the main stored forage used in Ontario. It supplies adequate amounts of crude protein when harvested at the correct stage of maturity, but it is significantly lower in energy than grains such as corn or barley. Alfalfa that has been selected or genetically modified to have higher digestible energy content would allow it to fill a higher

proportion of the ration for milking cows and thus reduce feed costs. Progress has been made in the production and assessment of alfalfa varieties with reduced NDF levels and increase cell wall digestibility. Another area of interest would be to modify the types of protein found in common forage plants.

High quality forage harvested as pasture can be a very economical method to feed beef cattle, develop beef and dairy breeding heifers, and grow market lambs. If these enterprises are to grow and prosper, more emphasis needs to be placed on managing the pasture resource to produce higher quality forage. Researchers need to focus on the forage quality requirements of the whole farm to integrate various methods and times of forage harvest into one complete system. Annual forage crops for stored feed or grazing should be considered here as well. The goal of the complete forage system should be to provide the maximum amount of nutrition from forages on a year round basis, supplementing with other feed sources only when the forage resource cannot provide those nutrients.

New species of forages need to be investigated for their ability to provide high quality forage in either pasture or stored feed systems. Before new types of alfalfa or other species are introduced to the marketplace, work should be done to ensure they can provide similar quality to existing material or else determine what management regime is needed to achieve the desired quality.

The OFCC recommends that research be directed at improving forage quality through genetic improvements, changes in management practices or evaluation of new species.

7. Control of diseases and nematodes – Ontario Oil and Protein Seed Crop Committee

Issue: Protecting soybean production from disease and nematode losses

Oilseed crops in Ontario are subject to relatively few diseases; however, disease losses have increased in the past ten years. Four or five important diseases require control to ensure sustainable consistent production. Chemical controls are environmentally and economically undesirable. The most effective way to control diseases of oilseeds and other field crops is through genetic resistance and effective management practices. The most important diseases of soybean in Ontario and estimated crop loss as a percentage of total production in 1994 are as follows: soybean cyst nematode (SCN) (0.80), Phytophthora root rot (PR) (0.50), Sclerotinia stem decay (SSD) (0.50), Rhizoctonia/Fusarium root rot (0.40) and pod and stem blight (PL) (0.20). These diseases accounted for approximately 65,250 tonnes in lost production or approximately $20 million. Although this loss is small compared to total production (2.9%), diseases can be devastating in certain areas and to individual growers. We need further extension work to draw attention to SCN losses and promote management of this disease.

Background: Control of SCN will require resistance/tolerance and effective management practices. Resistance to SCN is complex and difficult to identify but considerable success has been achieved in the USA where SCN has been a major problem for 30 years. Long-term crop rotation with nonhosts and resistant or tolerant varieties provides the most cost-effective control. As SCN spreads to additional counties in Ontario and races change, a continuous effort in breeding for resistance will be required to ensure high productivity.

Considerable success has been achieved in controlling PR by developing disease resistant cultivars. Resitance genes can be identified and incorporated into soybean varieties by relatively simple screening techniques.

However, the development of new races necessitates the continuous development of new varieties with tolerance and monogenic resistance.

Sclerotinia stem rot is increasing in importance in Ontario and the north-central U.S.A. Varieties differ in tolerance to the disease but monogenic resistance has never been identified. This disease can cause severe losses but tends to occur sporadically. Crop rotation with nonhosts is recommended but once a field becomes infested with sclerotia (long term resting structures) the disease could reappear whenever conditions are favourable. Planting early varieties is effective in reducing disease severity and decreasing inoculum but growers are unlikely to accept an annual yield loss to control a sporadic disease. Full season, resistant/tolerant varieties and an effective management package could reduce the white mould problem.

Rhizoctonia/Fusarium root rot occurs in all soybean areas and soil types. Disease severity increases with plant stress caused by alternating wet and dry soil conditions. Most commercial varieties have at least moderate tolerance that was selected along with vigour and high yield.

New emerging or increasing threats are
a) virus causing seed coat discolouration transmitted by aphids
b) sudden death syndrome) fusarium wilt
d) root rots
e) increased seedling diseases in reduced tillage systems

8. Forage Yield – Ontario Forage Crops Committee

In the current situation, very little plant breeding work is being done on alfalfa or trefoil in the province. In other legume species and in the grasses there is no varietal breeding effort at the present time. Most alfalfa varieties on the recommended list are now coming from one of five breeding programs in the United States. In all other species new varieties are random arrivals from any other temperate agricultural part of the world. In other words the competitive advantage of Ontario's forage industry in terms of superior varieties is largely a lottery of arrivals.

It is a concern of the OFCC that so little effort is directed at improvements in the yield of forages being grown in the province. Clearly advances have been made from multiple pest resistance in alfalfa to improvements in winter hardiness of red clover. Some varieties have been truly outstanding, such as Climax timothy released in 1947 and still on the list....but is it time to reemphasize the importance of remaining competitive in all of the forage species? The grass breeding program at the Ottawa station has been terminated. None other exists in eastern Canada.

9. Cultivar Development, testing and Genetic Improvement of White and Coloured Beans – Ontario Pulse Committee

Details The detailed objectives are listed in order of priority. cultivar release and germplasm improvement through intra- and inter-specific hybridization followed by conventional and biotechnology-aided selection methods.

1) Conventional breeding and performance testing of cultivars for:

- Yield and yield stability
- Quality traits including cooking and canning quality, seed colour and size, mechanical damage
- Agronomic traits including upright plant architecture, harvestability, row spacing, disease resistance, environmentally friendly production
- Improved yield potential with early to full season maturity and upright plant architecture.

-Cooking and canning quality acceptable for domestic and international trade,
-Increased resistance to common and halo bacterial blight, white mold and root rot diseases,
-Pyramiding resistance to anthracnose and bean common mosaic virus races prevalent in Ontario and other major genes controlling resistance to pests,
-Transfer of resistance to potato leafhopper to dry beans adapted to Ontario.
-Testing lines/cultivars in coop. trials to identify superior lines for registration and to generate performance data.

2) Application of biotechnology to improve efficiency in cultivar development through:

-Identification of RAPD markers linked to common bacterial blight resistance genes aiding molecular marker assisted selection,
-Integrating selection methods based on molecular estimates of genetic distance with conventional selection techniques to accelerate simultaneous improvement of yield, adaptation, quality and pest resistance,

3) Germplasm improvement and utilization through:

-Multi-cycle intermatings of adapted and donor germplasm sources (within and between Meso-American and Andean races, and utilization of tepary bean and scarlet runner beans) to widen the germplasm base,
-Release of improved germplasm to breeders of private and public institutions.

4) Performance testing

Background: Edible beans are an important niche crop to the Ontario Agricultural economy. Over 75% of edible beans are exported. Public research is required to develop germplasm, and varieties that are adapted to Ontario's climate; and possess the quality traits required by the market place. Without a complete system of development and testing, the economic benefit to Ontario's economy will not be realized.

10. Performance Testing – Ontario Cereal Crop Committee

Background: Development of new varieties for Ontario conditions is paramount to a strong agricultural sector. Registration requirements have been reduced, in order to allow for a more rapid entry into the marketplace for varieties with special traits and/or higher yield potential. While entry of these new genetics is positive, evaluation of area of adaptability and other agronomic traits is essential to allow the industry to prosper. A strong performance testing system is the most efficient method of determining the best way to use new genetic

developments. Without performance testing, it will be very difficult for the industry to move forward to the benefit of all.

Economic importance: The value of this system is difficult to determine. Conservative estimates place the increased production and quality potential at $20 million dollars annually.

Competitiveness: The identification of better yielding and area specific cereal varieties gives Ontario growers a competitive advantage to areas that do not have broad based, well designed performance testing systems. This leads to a more competitive milling and baking industry, as quantity and quality of needed products can be produced close to home, reducing transportation and storage costs.

Social benefits: Growers are less dependent on support programs with high yielding, premium quality crops. Further development of the handling and processing industry will be encouraged, leading to increased employment and prosperity.

Environmental benefits: Higher yielding crops sequester more carbon, add organic matter back to the soil, and help reduce potential erosion through improved soil structure and canopy effects.

11. Performance testing of soybean varieties – Ontario Oil and Protein Seed Crop Committee

Issue: Providing information for variety selection decisions

With the imminent loss of merit testing for registration of soybean varieties, even more emphasis needs to be placed on generating data which allows producers to make profitable variety decisions.

Background:
Registration with merit, coupled with performance testing has allowed producers to grow with confidence, new varieties suited for Ontario.
The consistent yield improvement came even though expanded acres came from new, shorter season areas of the province. This growth came with no yield penalty.
New varieties whether they be from conventional breeding or those with special traits derived from biotechnology, need performance data to succeed in the marketplace.
Producers can only explore new market classes successfully if there is unbiased performance data. Yield adaptability and potential premiums need to balance with a positive bottom line for the producer.

12. Continue and Improve the Public System of Forage Variety Testing In Co-operation with Industry Stakeholders – Ontario Forage Crop Committee

Background:

The OFCC has been conducting unbiased evaluation of varieties for yield and persistence since the committee was established in 1956. The work was undertaken to: i) Identify the varieties which merit use by forage producers in Ontario ii) Provide relative performance information among forage varieties available in the marketplace, and iii)

Provide data to Canadian Food Inspection Agency to allow the legal sale of these varieties. In 1991, the OFCC was the first provincial recommending committee to undertake quality evaluation of forage varieties in addition to yield performance.

Forage yields and quality samples are collected from OFCC registration trials at public testing centres. The OFCC worked with the Seed Trade and the Canadian Food Inspection Agency during 1997 to improve the system of support for variety registration. This allowed varieties that meet OFCC performance criteria to be supported for registration using some or all data from outside Ontario. This allowed producers to have access to these varieties 2 years earlier than under the previous system. The OFCC still conducts performance testing and still provides performance data from public trials in Ontario to producers as in the past.

A significant change could occur over the next year as the CFIA has proposed that merit-based registration be eliminated for all forage crop species. Whether a requirement for some data on agronomic performance will be required is not clear at the time of writing. This could significantly affect the performance testing system since new varieties may no longer have a legal requirement to be tested in public Ontario tests. The OFCC has prepared a position paper to present to CFIA which recommends that some agronomic data be available to producers at the time of registration. (Appendix I) The OFCC has essentially accepted that quality testing cannot be made financially viable through the committee structure and has decided to eliminate that option for the near term. At the same time, the OFCC has redesigned its fee structure in an attempt to secure enough funds to continue public testing while still extending the results of the testing to the end user. (Appendix II) The new fee system should eventually incorporate not only the seed trade, but also commodity groups and other interested parties.The OFCC recommends that variety testing for yield and persistence be continued.

Recommendation 3

Market Responsiveness

Research strategies to address market development, new product development, food safety and enhancement.

Competing in traditional commodity markets will become more difficult for Ontario producers in the next several years. This will require increasing emphasis on the development of new higher-value markets for Ontario field crops with the integration of the producer up the value-chain. Research in these areas has been ongoing for several years, however, with the increasing emphasis on life-sciences and food quality and safety, further targeted efforts are required. Most of this work will strive to take advantage of the history of I.P. crop production in Ontario and the existing and developing infrastructure to support these markets.

1. Development of specialty soybean types and alternative uses for soybean – Ontario Oil and Protein Seed Crop Committee.

Issue: Increasing opportunities for adding value to soybean

Oil modifications:

Food Use -modify oil to improve healthfulness, and increase oil functionality
Industrial Use -modify oil to increase functionality

Protein/Carbohydrate Modifications:
Food Use -modifications to improve quality of soyfoods, capture premium soyfood markets
Feed Use -increase the content of soybean protein or essential amino acids to increase value of soybean meal as a feed supplement, remove or reduce anti-nutritional factors.

Background: Soybean oil and protein are used in the manufacture of human food, animal feed, and various industrial products. Soybean oil dominates the domestic and world vegetable oil markets. The oil contains saturated [palmitic (11%), stearic (4%)], monounsaturated [oleic (25%)], and polyunsaturated [linoleic (50%), linolenic (9%)] fatty acids. Because of its fatty acid profile, the oil is used primarily as a salad and cooking oil and as a fat in the production of shortening and margarine. Only 2% of all soybean oil produced is used in industry. Specific genetic modifications can be made to improve oil content, quality and stability. These modifications can educe processing costs and increase the marketability and value ($.08 to $3 US /bushel) of soybeans (Iowa Agriculture & Home Economics Experiment Station Special Report 92)

Soybean protein constitutes about 46% of soybean meal and is used as an ingredient in animal feed, human food, and industrial products. About 95% of soybean meal is used to supply protein in livestock (poultry, swine, cattle) feeds. For use in food and products and industrial products, soybean meal is processed into various edible protein ingredients, including flour, concentrates, isolates. Most edible protein products are used to replace the use of animal and dairy proteins in foods for human consumption. Industry uses soybean protein primarily in the manufacture of paper coatings. Improving the content and quality of soybean protein can add $.06 to $.46 (US) to each bushel of soybean (Iowa Agriculture & Home Economics Experiment Station Special Report 92) and increase the nutrition, energy density, and marketability of soybean meal.
Soybean produced in Ontario must compete in the international marketplace with soybean and other oilseeds produced throughout the world. To maintain a share of the specialty oilseed market, each Ontario soybean variety must possess traits that provide added-value and a unique identity. Using current technologies (chemical mutagenesis, biotechnology, and breeding) oil and protein modifications can be made to add value and improve the marketability of soybean varieties developed in Ontario.

Detailed modifications include

A. ***Oil Modifications***:

1. Food Use
a) Increase palmitic and/or stearic acids (16-18%) to improve crystalline structure and use in solid fat applications
b) Reduce level of saturated fats (<6%) to reduce negative health effects
c) Increase oleic (while lowering saturated and/or polyunsaturated fats) to increase oxidate stability

2. Industrial Use
a) Increase linolenic acid (>55%) to replace linseed oil as a drying oil in the manufacture of paints and coatings

b) Add exotic fatty acids [recinoleic (>85%) and lauric acid (>50%)] to soybean to increase use in the manufacture of lubricating oil and other industrial products

B. ***Protein/Carbohydrate Modifications*:**

1. Food Use

a) Reduce content of fermentable carbohydrates to reduce intestinal discomfort and flatulence

b) Increase content of fermentable carbohydrates (sucrose, glucose, fructose) and increase the use of soybeans in the manufacture of soyfoods (miso, natto, tempeh)

c) Reduce lipoxygenase enzymes to reduce the beany or off-flavour

c) Reduce phenolics and flavonoids to reduce astringency and bitterness

2. Feed Use

a) Increase the content of soybean protein to increase value of soybean meal as a high protein feed Supplement

b) Increase content of essential amino acids (methionine and cysteine)

c) Increase lysine content to reduce the concentration of crude protein in the diets of poultry and swine

d) Reduce protease inhibitor activity by 80% to improve the digestion of proteins and reduce pancreatic hypertrophy

e) Reduce phytate to improve the availabilty of minerals protein solubility

f) Reduce goitrogens to reduce the risk of goiter

2. Develop Value Added Markets for Corn – Ontario Corn Committee

Food grade quality corn represents a major value-added market for Ontario corn that has the potential to expand significantly. Currently, much of the market is being filled with corn or corn products from the U.S.A. Development of food grade quality corn suitable for production in Ontario represents a significant import-replacement opportunity, as well as an important export market.

Research has begun within the University of Guelph, primarily at Ridgetown College, directed toward breeding early white, food grade corn inbreds and hybrids, suitable for production in Ontario and toward identifying yellow corn hybrids of food grade quality, in co-operation with the private sector.

Long-term funding is required to enhance the technical support for these programs and to ensure the continuation of this work.

3. New Markets – Ontario Cereal Crops Committee

Background: Development of new markets is a way to expand acreage and value of the crops grown. When successful, efforts of this nature often have great benefit. Milling oat and malting barley are two areas that are currently underway within the sector. This has the potential to expand production by up to 100,000 acres, into a premium market. Other opportunities exist that should be investigated.

Economic importance: Premiums for this type of market often run from $10 to $40 per tonne to the producer, and can develop whole new processing opportunities. Care must be taken, however, to discern actual acreage that could be affected by these developments. Development of high value biotech components that require very small acreage, while beneficial, have far less overall economic impact to the sector.

4. Edible Bean quality evaluation and utilization – Ontario Pulse Committee

Details Customers of edible beans are placing more value on quality traits. The industry needs to examine the composition of edible beans for traits of special value for food, neutraceuticals, or industrial uses. Examples would include screening for components such as Biofavonoids, Saponins, oliosaccharides. Ontario is well positioned to grow premium priced speciality bean types. Industry has invested significantly in infrastructure and other resources to meet ISO standards for the export market.

Background Static yields and economies of production have placed white beans in Ontario at a competitive disadvantage to Manitoba and recent entrances to this market. Ontario has maintained market share of large seeded coloured bean types due to demand for diverse market types, reputation for quality, and industry infrastructure for identity preserved production and marketing. The industry sees a need to shift the focus from producing a commodity to a 'market or buyer' driven bean that have unique or novel output traits. The value of such traits must return incremental margins to all sectors of the industry. The special quality characteristics for food and industrial use are largely unknown. It is recognized that edible beans contain some unique starch, protein and fibre characteristics. Health professionals have recognized the value of edible beans for their health benefits. However only a few researchers have studied pulse utilisation for food and industrial uses. Little is known of the compositional traits that may be of special value.

Current Research/Extension Activities
Work at AAFC, Harrow and University of Guelph has focused on developing, and evaluating germplasm and varieties for canning quality. Efforts have also been directed to factors that have an influence on flatulence, and altered sugar content and quality. Ongoing research is working on expanding the germplasm base.

Gaps/Barriers/Deficiencies

Funding is required to conduct a literature review of research on quality components, complete compositional analysis, and investigate traits that may have special value. Research also needs to address standard methodologies in conducting analysis. In addition the industry needs to keep abreast of research into the health benefits of edible beans and new and expanded uses for food, neutraceuticals, and industrial use.

Research Recommendation High priority, little research underway, new funding requested.

5. Development of Alternative Pulse types for Ontario – Ontario Pulse Committee

Issue Development of alternative pulses, specialty market types.

Details AAFC, Harrow is currently conducting research into cultivar development and agronomic practices for pigeonpeas, mungbeans, kintoki, and adzuki for Ontario. Further research is required to investigate agronomic practices and develop and test cultivars.

Background: There is a small but growing demand domestically and for export of speciality bean types. Ontario for example imports over 5 million lbs. of mungbeans, mainly for sprouts, each year. Mungbean yields in Ontario trials have averaged 1000-1300 lbs./ac. The market price in Ont. Is 40-50 cents/lb. on average, and as high as 70-80 cents at times. One variety has been developed AC Harowsprout, and is being multiplied by select seed growers. Mungbeans are adapted to areas with 2900 hu or more while pigeonpeas are longer season, adapted to areas receiving 3200 hu or greater. Kintoki, Otebo, and adzuki beans are being grown on a limited but growing number of acres for export to Japan.

Research Recommendation Important, continue research at existing level

6. Forage Grading System – Ontario Forage Crops Committee

The importance of a well defined grading system in the buying and selling of agricultural commodities is undisputed. In contrast, no uniform grading system for legume, grass or mixed hays exists in Canada nor in the U.S. Hay purchasers located in areas with no consistent hay grading system must evaluate each hay lot purchased. They can apply the hay grading system of their choice, sample hay and run chemical analyses to evaluate hay quality, or visually inspect hay and make an informed opinion of the hay. The best method involves combining visual judging with chemical analyses. With many components to evaluate the problem becomes one of simplifying the values to establish a grade that satisfies both seller and buyer.

The problem is particularly acute in Ontario where hay may be shipped long distances. Markets exist not only in the southern U.S., but also overseas. The OFCC regards this issue as an important one that requires a system paralleling the benefits of other commodity grading systems such as corn or wheat. The OFCC defines this issue as one of pulling existing information together and arriving at a consensus rather than one that requires an expansion of research efforts.

7. Improvement to Grading System – Ontario Cereal Crops Committee

Background: Grain grading has tremendous impact through the industry. Grain downgraded reduces the price paid to the producer, may restrict export options, and grain that is not graded properly due to factors like fusarium can become unusable by millers once actual vomitoxin levels are known.

Despite the importance of grain grading to the industry, it has remained a subjective test, relying on visual inspection for colour and other parameters. With the vagaries of human eyesight, this has led to many inconsistencies within the grading system. This was proven by a study undertaken in 2000 by Dr. Art Schaafsma.

Development of an objective grain grading system is essential to ensure proper streaming and returns of grain produced and processed across the industry.

Economic importance: Grain graded as feed that is actually of milling quality reduces the price paid to the producer by $15/tonne. Grain that is accepted as milling quality, which is subsequently found to be above acceptable limits for vomitoxin, is of no value to the miller and must be removed from the system at significant cost.

Competitiveness: A consistent and accurate grain grading system would ensure that buyers of Canadian grain abroad would receive the quality of product that they expected. This would further enhance the Canadian reputation for quality, and premiums attached. This grading system would also ensure that both producers and end users in the province are treated fairly.

8. Environmental Impact of Genetically modified Crop production – Ontario Oil and Protein Seed Crop Committee

Issue: To evaluate and monitor the ecological and environmental impact of corn hybrids, soybean varieties and other crops as required with special traits derived through biotechnology.

Service Priorities

Service priority 1: Extension and information validation

Background: As new technologies become available, information about these technologies must be disseminated throughout the sector. These technologies must also be assessed for wide area adaptability, or specific geography or situations were they perform to the benefit of the user. Without this extension and validation of new technologies, advancements may never be accepted by the industry, or uptake may be slowed dramatically.

While extension efforts are often assumed to be intrinsic within the development of new technologies, this is rarely the case. Many research personnel are simply too busy to make this occur, or lack the network to promote the technology effectively. It is essential that this extension link exist, both to speed uptake and to make the research community aware of new and emerging problems and opportunities.

Economic importance: promoting uptake of the best new innovations ensures rapid acceptance and adoption of these technologies. This ensures that the full value of new enhancements is realized. Extension services are considered "GATT green", indicating that all countries accept the tremendous value that extension efforts have.

Appendix 1.

Ontario Tobacco Committee Research Priorities

RESEARCH PRIORITIES

The following list (descending order) of research priorities was identified by the tobacco production and protection practices sub-committee.

1- Fungicide screening for damping-off of tobacco caused by *Rhizoctonia* solani

The fungicide Benlate is currently used to control damping-off of tobacco, caused by the phytopathogenic fungus, *Rhizoctonia solani* and is the only pesticide approved for this use in Canada. On April 19, 2001, the manufacturer of this fungicide, E. I. Du Ponte de Nemours and Co., announced that this product will no longer be available for sale by the end of 2002. Alternative products must be tested for their efficacy and their suitability as potential replacements of Benlate for controlling this widespread problem.

2- Development of tobacco varieties, with broad based, high tolerance to pest and diseases using conventional approaches and investigate the use of marker assisted selection.

The tobacco breeding program has been very successful in developing varieties that meets the needs of the growers and the industry. Several high yielding, superior quality and pest resistant cultivars have been developed using conventional breeding methodologies. However, in recent years, molecular markers linked to traits of interest have been identified in a number of crop species. This has greatly enhanced the breeding programs of many crops. In tobacco very few molecular markers have yet been developed and no marker-based map is available. These are achieved through conventional hybridization, selection of desirable traits, and performance evaluation.

3- Development of fungicide replacement, millet or other nematode suppressing crops to control nematodes.

Reduced tobacco yields in southwestern Ontario due to the root-lesion nematode (*P. Penetrans*) has increased reliance on fumigant nematicides. However, fumigants are costly and their use present environmental concerns. Cost effective and environmentally friendly biological control measures are needed in order to effectively manage nematode populations below economic threshold levels. A rotation system including crop plants that are poor host for root-lesion nematode may offer a sustainable approach.

4- Fungicide screening for control of metalaxyl insensitive blue mold

Blue mold is a serious concern to most tobacco growers in Ontario. When the disease pressure is high, both yield and quality are severely affected. In order to properly control the spread of the disease, it is important to evaluate compounds for control of blue mould on flue-cured tobacco and to study the effect of these compounds on the quality of the tobacco, regarding chemical composition, agronomic and smoke taste characteristics and residues within the cured leaf.

5- Evaluation of control measures for control of bacterial soft rot and *Aspergillus.*

Bacterial soft rot and Aspergillus have been identified as a recurring problem during mid to late season tobacco production in Ontario. These diseases are capable of rapid spread during flue-curing, especially in stick kilns, causing large losses in harvested products and degraded product quality.

6- Further develop float/dry tray systems for producing seedlings with emphasis on i) pest management (damping-off and disinfecting), ii) hardening-off, and iii) uniformity.

Unheated greenhouse beds, seeded to a density of approximately 100 to 120 seedling per square foot, normally provide excellent seedlings for transplanting. However, because of the labour concern for pulling plants for transplanting and for the transplanting process itself, tobacco growers are moving towards a less labour intensive seedling production. The float/dry tray systems may be a solution for some growers, however a study needs to be conducted to investigate these systems for producing seedlings in relation to pest management, hardening-off, and uniformity.

7- Effect of different nitrogen rates, topping height and varieties on tobacco yield and quality.

Results from a survey conducted at the farm level in the flue-cured tobacco growing areas of Ontario over a three-year period (1998-2000), indicate a wide variation in cured leaf chemistries. Available nitrogen was identified as being an influential factor in cured leaf chemistries. Because of the survey results, there is now a need to identify the effects of different nitrogen rates and topping heights, which are also known to affect cured leaf chemistries, on certain varieties of flue-cured tobacco grown in Ontario.

8- Evaluate sucker control products with improved efficacy and lower usage rates than those used currently.

Sucker control in flue-cured tobacco is one of the most important practices without which both yield and quality are adversely affected. Several chemical control measures are available that may be applied before and after topping. However, most growers are not satisfied with the efficacy of these products. Therefore, new products with improved efficacy and lower usage rates than those currently used need to be evaluated.

9- Identify the cause (s) and solution (s) to tobacco bruising.

A survey examining the incidence and potential causes of bruise green grades was conducted in 1994. Most growers felt that it was caused by dry conditions, lack of nitrogen and choice of cultivar, or an interaction between those factors. Bruise green grades are now being monitored in the breeding program so that genotypes prone to bruising can be selected out before commercialization. No work has yet been undertaken that addresses the climatic or agronomic conditions that may influence this condition.

10- Fungicide screening for greenhouse and field control of target spot.

Since the identification of the disease in 1994, it has occurred in widespread locations throughout the Ontario tobacco belt. Occurrences of this disease on a widespread, regular basis will likely decrease yield and quality of tobacco, particularly on the lower part of the plant where the disease is likely to be most severe. To minimize the occurrence of the disease, it is important to evaluate compounds for control of target spot disease on flue-cured tobacco.

11- Screen insecticide for control of wireworm, seed born maggots on tobacco transplants.

Although in recent years no single insect has caused devastating losses in Ontario fields of flue-cured tobacco, in the absence of effective insecticide screening and management programs, several insect pests can emerge and certainly reduce yield and quality of the crop.

12- Optimize cured leaf quality by evaluating direct measurement of weight loss as a curing control technique.

Curing tobacco requires control of temperature and humidity plus the knowledge of how, when and at what rate to apply heat and ventilation to produce optimum leaf quality. Curing is the single most important post harvest factor influencing leaf quality, yet the curing process is poorly understood.

13- Further develop measures to reduce TSNA's in cured tobacco.

Nitrosamines are chemical compounds considered to be carcinogenic (cancer-causing) Nitrosamines have been the focus of research for many years. In Ontario, prior to 2000, almost all curing systems to cure flue-cured tobacco were equipped with a direct-fired heating system. In the year 2000 indirect-fired heating systems were introduced. Research conducted at Delhi comparing direct-fired to indirect-fired indicates

that heat indirect-fired reduced TSNA in the cured leaf by about 94%. Further studies are needed to develop measures to reduce TSNA in cured tobacco.

Appendix II – Committee Memberships

APPENDIX II

ONTARIO CEREAL CROPS COMMITTEE - MAIN

Organization	*Representative*
OMAFRA	➢ Mr. P. Johnson, Chair
Ridgetown College	Dr. A.E. Smid, Secretary-Treasurer, exofficio
OCCC Production Subcommittee	➢ Dr. G. Hoekstra
Public Plant Breeders	➢ Dr. D.E. Falk
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
OCCC Variety Subcommittee	➢ Mr. A.R. McElroy
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
O.S.G.A.	➢ Mr. P. Szentimrey (L. Trepanier, alt.)
Commercial Plant Breeders	➢ Mr. L. P. Shugar (T. Welbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (S. Ryzebol, alt.)

APPENDIX I (b)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE - VARIETY

C.P.B., C.S.T.A.	➢ Mr. A.R. McElroy, Chairman
University of Guelph, O.A.C.	➢ Mr. J. Rowsell, Secretary
Millers' Rep.	➢ Mr. G. R. Carson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. K. M. Ho
Kemptville College	➢ Dr.G. J. Hoekstra
University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
Crop Technology, OMAFRA	➢ Mr. P. Johnson
Crop Technology, OMAFRA	➢ Mr. S. Banks
C.G.C.	➢ Mr. J. Lowe
C.S.G.A.	➢ Mr. M. Mackinnon
University of Guelph, O.A.C.	➢ Dr. D.E. Falk
E.C.O.R.C.	➢ Dr. R. S. Pandeya
Quality Co-ordinator	➢ Dr. L. Pietrzak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S.	➢ Mr. J. Rowsell
Disease Co-ordinator	➢ Dr. A. Xue
Ridgetown College	➢ Dr. A. E. Smid

C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
O.P.C.R.S.C., O.C.P.C.	➢ To be Appointed
O.S.G.A.	➢ Mr. P. Szentrimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
Thunder Bay Research Station, OMAFRA	➢ Mr. G. Scheifele
E.C.O.R.C.	➢ Dr. H. Voldeng

APPENDIX I (c)
ONTARIO CEREAL CROPS COMMITTEE - QUALITY, OF THE SUBCOMMITTEE VARIETY

P.R.C.	➢ Dr. L. Pietrzak, Chair
Robin Hood Multifoods	➢ Mr. G. R. Carson
Quaker Oats Co. Ltd.	➢ Mr. M. Morrison
Corporate Foods	➢ Mr. N. Woodbeck
C.G.C.	➢ Mr. J. Lowe
Reid Milling	➢ Mr. M. Mak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
A.D.M.	➢ Mr. M. Neale
Hayhoe Flour Mills	➢ Mr. M. Hayhoe

APPENDIX I (d)
ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE - PRODUCTION

Kemptville College	➢ Mr. G. J. Hoekstra, Chair
O.M.A.F.R.A.	➢ Mr. S. Banks, Secretary
North West Ontario	➢ Mr. G. Scheifele
C.S.G.A.	➢ Mr. M. MacKinnon
University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
University of Guelph, O.A.C.	➢ Dr. D. Falk
Ag & Rural Division, O.M.A.F.R.A.	➢ Mr. P. Johnson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. A. R. McElroy
E.C.O.R.C.	➢ Dr. T.M. Choo
E.C.O.R.C.	➢ Dr. R. Pandeya
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S. (O.S.M.R.S.C.)	➢ Mr. J. Rowsell
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)

E.C.O.R.C.	➢ Dr. A. Xue
E.C.O.R.C.	➢ Dr. H. Voldeng
Ridgetown College	➢ Dr. A. E. Smid
O.S.G.A.	➢ Mr. P. Szentimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
C & M Seeds	➢ Ms. E. Sparry
W.G. Thompson & Sons Limited	➢ Mr. M. Etienne
O.P.C.R.S.C., O.C.P.C.	➢ To be appointed

Ontario Corn Committee

Ontario Oil and Protein Seed Crop Committee

OOPSCC ADDRESS LIST

VSC - Variety Subcommittee Members
ROC - Rest of Comm (VSC + ROC = OOPSCC with no duplicates)
CSS - Canadian Sponsor Soybean
CSC - Canadian Sponsor Canola

Dr. Gary Ablett
3100 Area Coordinator
Ridgetown College-University of Guelph
RIDGETOWN, Ontario
N0P 2C0
VSC
CSS
Tel: 519-674-1505
Fax: 519-674-1515
E-mail: gablett@ridgetownc.uoguelph.ca

Dr. Terry Anderson
Agriculture & Agri-Food Canada
Research Centre
HARROW, Ontario
N0R 1G0
VSC
Tel: 519-738-2251 x 426
Fax: 519-738-2929
E-mail: andersont@em.agr.ca

Mr. Dan Brown [ISGL; ASGP, OSGA,alt.]
Canadian Seed Growers Association
Inwood Seed and Grain Ltd.,
Box 130, James St.,
INWOOD, Ontario
N0N 1K0
VSC
CSS
Tel: 519-844-2426
Fax: 519-844-2424
E-mail:

Mr. Norm Woodbeck
Canadian Grain Commission
220-120 Wellington St. West
CHATHAM, Ontario
N7M 5K3
ROC
Tel:
Fax:
E-mail: nwoodbeck@cgc.ca

Mr. James Beer (OSGA Alt)
Ontario Seed Growers' Association (Alt)
R.R.#4
ARTHUR, Ontario
N0G 1A0
VSC
Tel: 519-848-3488
Fax: 519-848-3857
E-mail:

Ontario Soil & Crop Improvement Assoc.
R.R. #1
BURGESVILLE, Ont.
N0J 1C0
VSC

Mr. Neil Driscoll
Ont. Canola Growers Association
R.R. #1
PALMERSTON, Ont.
N0G 2P0
VSC
Tel: 519-638-3252
Fax: 519-638-5420

Ms. Louise Duke [EXOF]
Canadian Food & Inspection Agency
Variety Registration Office
59 Camelot Dr.,
NEPEAN, Ont.
K1A 0Y9
VSC
Tel: 613-225-2342 x 4387
Fax: 613-228-6629

E-mail:

Dr. Elroy Cober [CORC]
Secretary
Agriculture & Agri-Food Canada
ECORC, CEF Bldg. 110
OTTAWA, Ont.
K1A 0C6
VSC
CSS
Tel: 613-759-1610
Fax: 613-759-6597
E-mail: coberer@em.agr.ca

Mr. Ron Guillemette
2600 Area Co-ordinator
Agriculture & Agri-Food Canada
ECORC, CEF Bldg.110
OTTAWA, Ontario
K1A 0C6
VSC
CSS
Tel: 613-759-1611
Fax: 613-759-6597
E-mail: guillemettr@em.agr.ca

Mr. Chris Gillard
Ridgetown College Univ. of Guelph
RIDGETOWN, Ont.
N0P 2C0
VSC
Tel: 519-674-1632
Fax: 519-674-1600
E-mail: cgillard@ridgetownc.uoguelph.ca

Ms. Gail Harris
SeCan Association
200-57 Auriga Dr.,
NEPEAN, Ontario
K2E 8B2
Tel: 613-225-6891
Fax: 613-225-6422
E-mail: secan@secan.com

Dr. Mark Gijzen
Agriculture & Agri-Food Canada
Pest Management research Centre
1391 Sandford St.,
LONDON, Ontario
N5V 4T3
ROC
Tel: 519-663-3552
Fax: 519-663-3454
E-mail: gijzenm@em.agr.ca

Mr. L. Hawkins [ZENS]
Zeneca Seeds
105 Queen St., West
ST. MARYS, Ontario
N4X 1A8
ROC
CSS
Tel: 519-284-0219
Fax: 519-284-0475
E-mail:

Mr. Alejandro Hernandez [FLSL]
CSTA rep
First Line Seeds
R.R. #2
GUELPH, Ontario
N1H 6H8
VSC
CSSTel: 519-821-0882
Fax: 519-821-9755
E-mail: ahernandez@soybeans.com

Dr. Dave Hume
Canola Coordinator
Dept. of Plant Agriculture
University of Guelph
GUELPH, Ont.
N1G 2W1
VSC
Tel: 519-824-4120 x 3386
Fax: 519-763-8933
E-mail: dhume@crop.uoguelph.ca

Bob Hart (OSGA Alt) [PROS]
PRO Seeds of Canada
R.R. #6
WOODSTOCK, Ontario
VSC
CSS
Tel: 519-537-5157
888-537-5157
Fax: 519-537-5169
E-mail:bobhart@oxford.net

Dr. Howard Love
Svalof Weibull Seeds
P.O. Box 217
LINDSAY, Ontario
K9V 5Z4
VSC
CSS
CSC
Tel: 705-324-3293
Fax: 705-324-2550
E-mail:

Mr. John Madill
Kemptville College of Univ. of Guelph
KEMPTVILLE, Ontario
K0G 1J0
VSC
Tel: 613-258-8347
Fax: 613-258-8384
E-mail: jemadill@magi.com

Mr. Rene Petroski
Ont. Soybean Grower's Marketing Board (Alt)
Box 1199
CHATHAM, Ontario
N7M 5L8
VSC
Tel: 519-352-7730
Fax: 519-352-8983
E-mail: siler@soybean.on.ca

Mr Brad Martin
Ontario Canola Growers' Assoc. (Alt)

R.R. #1
GOWANSTOWN, Ont
N0G 1Y0
VSC
Tel: 519-343-3035
Fax: 519-343-4589
E-mail: bradm@wcl.on.ca

Mr. Don McClure [NKSL]
CSTA Plant Breeder rep
Novartis Seed
R.R. #1
ARVA, Ontario
N0M 1C0
VSC
CSS
Tel: 519-461-0072 x 232
Fax: 519-461-0770
E-mail:

Dr. Stephan Molnar
Agriculture & Agri-Food Canada
Eastern Cereal and Oilseed Res. Crt.
Room 4014, K.W. Neatby Bldg.
C.E.F.
OTTAWA, Ont.
K1A 0C6
ROC
Tel: 613-759-1687
Fax: 613-759-1701
E-mail: molnarsj@em.agr.ca

Dr. Vaino Poysa
Agriculture & Agri-Food Canada
Harrow Research Centre
HARROW, Ontario
VSC
CSS
Tel: 519-738-2251 x 467
Fax: 519-738-2929
E-mail:

Dr. Istvan Rajcan [2800 Co-ordinator]
Dept. of Plant Agriculture

University of Guelph
GUELPH, Ontario
N1G 2W1
VSC
CSS
Tel: 519-824-4120 x 3564
Fax: 519-763-8933
E-mail: irajcan@plant.uoguelph.ca

Mr. Rob Templeman, Chair OOPSCC
Pioneer Hi-Bred Limited
3197 Road 179 West Perth
R.R. # 2
STAFFA, Ontario
N0K 1Y0
VSC
Tel: 519-345-0169
Fax: 519-345-0170
E-mail: rob.templeman@pioneer.com

Mr. Albert Tenuta
OMAFRA, Crop Technology Programme
Ridgetown College Agric. Tech.
RIDGETOWN, Ontario
N0P 2C0
VSC
Tel: 519-674-1617
Fax: 519-674-1564
E-mail: atenuta@omafra.gov.on.ca

Mr. John Rowsell
N.L. Agr. Res. Stn.
NEW LISKEARD, Ontario
P0J 1P0
ROC
Tel: 705-647-6701
Fax: 705-647-7008
E-mail:

Mr. John Van Herk, Jr [HYLD]
Hyland/W.G. Thompson & Sons Ltd.
P.O. Box 130
BLENHEIM, Ontario
N0P 1A0

VSC
CSS
CSC
Tel: 519-676-8146
Fax: 519-676-5674
E-mail: jvanherk@wgthompson.com

Mr. Tom Welacky, Soybean Coordinator
Agriculture & Agri-Food Canada
Greenhouse & Processing Crops Research Centre
HARROW, Ontario
N0R 1G0
VSC
Tel: 519-738-2251 x 469
Fax: 519-738-2929
E-mail: welackyt@em.agr.ca

Mr. Bill Zubrinic
Ontario Oil Crushers Assoc.
Canamera Div. / Central Soya of Canada Ltd.
515 Victoria Ave., N.
HAMILTON, Ontario
L8N 3K7
VSC
Tel: 905-527-9121
Fax: 905-527-3162

Mr. Tim Welbanks
CSTA rep alternate
Pioneer Hi-Bred Ltd.
P.O. Box 730
CHATHAM, Ontario
N7M 5L1
VSC
Tel: 519-352-6350
Fax: 519-436-6753
E-mail:

Mr. Zenon Lisieczko
CSTA Planter Breeder rep alternate
Monsanto Canada Seeds
Box 250
Listowel, ON

N4W 3H2

Mr. Leo Guilbeault
OSCIA rep
RR#2
Belle River, ON
N0R 1A0

ONTARIO PULSE COMMITTEE

II. Committee Membership:

Main Committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Bob Roy, Chair/Treasurer 1998-2000	AAFC/SCPFRC-Delhi	Box 186, Delhi, Ont N4B 2W9	(519) 582-1950/582-4223 royr@em.agr.ca
Chris Gillard, Secretary 1998-2001	Ridgetown College, U of Guelph	Ridgetown College St. E. Ridgetown, N0P 2C0	(519) 674-1632/674-1600 gillard@ridgetownc.uoguelp
Tino Breuer	OMPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566/652-9607
Brian Hall Chair	OMAFRA	tford Resource Centre, 581 St. Stratford, ON, N5A 5T8	(519) 271-0083/273-5278 brian.hall@omafra.gov.on.ca
Tom Smith	Plant Ag, U of Guelph	Ag. Dep., Univ. Of Guelph, uelph, ON N1G 2W1	(519)824-4120(ext8339) /763-8933 tsmith@uoguelph.ca
Soon Park	AAFC –Harrow	Harrow Research Centre rrow, Ontario, N0R 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Tom Michaels	Plant Ag. U of Guelph	Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120 tmichaels@crop.uoguelph.ca
Grant Watson (observer)	CFIA	Camelot Drive, Nepean	Gwatson@em.agr.ca
Jeff Ferguson	OBDA	6, St. Thomas, Ontario, N5P 3T1	(519) 631-3463/631-8843
John Van Herk Jr.	CPBC CSTA	Hyland Seeds Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146 676-5674 Jvanherk@wgthompson.com
Garnet Wright	OBPMB	# 1, Londesboro, Ont. N0M 2H0	fax: 519-482-3940
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455 527-0787
Jeff Allan	OSGA	R.R.#1 Brucefield	19) 233-9846 allan@toc.on.ca
Bill Lammers	CFIA		(519) 645-4021 / 645-5451

(observer)			
John Thomson	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 263-3034
Bernadine Wolfe	OCBGA	R.R. # 5, Mitchell, Ont.	(519) 348-4141/348-8165 wbwolfe@orc.ca
Mike Donnelly	OCBGA	#4, Thamesford, Ont. N0M 2M0	-519
Mike Tu	AAFC	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 738-2251/738-2929 tum@em.agr.ca

Variety Sub-Committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Bob Roy	AAFC/SCPFRC-Delhi	Box 186, Delhi, ON. N4B 2W9	(519) 582-1950/582-4223 royr@em.agr.ca
Chris Gillard,	Ridgetown College, U of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-1632/674-1600 cgillard @ridgetownc.uoguelph.ca
Tino Breuer	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566
Tom Smith	Plant Ag. U of Guelph	Plant Agriculture Department, Univ. Of Guelph, Guelph, ON N1G 2W1	(519) 824-4120(ext8339) tsmith@uoguelph.ca
Tom Michaels	Plant Ag. U of Guelph	Plant Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120 tmichaels@crop.uoguelph.ca
Brian Hall	OMAFRA	Stratford Resource Centre, 581 Huron St. Stratford, ON, N5A 5T8	(519) 271-0083/273-5278 brian.hall@omafra.gov.on.ca
Soon Park	AAFC -Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Garnet Wright	OBPMB	R.R. #1 Londesboro, Ont. N0M 2H0	fax: 519-482-3940
Grant Watson (observer)	CFIA	59 Camelot Drive, Nepean	gwatson@em.agr.ca
Allan Patterson (observer)	Patterson Grain		(519) 461-1829/461-0879

Bruce Cruikshank	OCBGA	R.R.#2 Paris	grbean@bis.on.ca
Jeff Ferguson	OBDA	R.R. # 6, St Thomas, Ontario	(519) 631-3463/631-8843
John Van Herk Jr.	CPBC CSTA	Hyland Seeds P.O. Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146/ 676-5674 Jvanherk@wgthompson.com
Mike Donnelly	OCBGA	R.R. #4, Thamesford, Ont. N0M 2M0	
John Thomson	OWBP	4206 Raney Cres. London Ont. N6L 1C3	(519) 263-3034 (phone & fax)
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455/527-0787
Jeff Allan (alt)	OSGA	R.R.#1 Brucefield	(519) 233-9846 allan@toc.on.ca
Les Coleman	OSGA	R.R. # 3, Kippen, Ont N0M 2E0	(519) 263-2990
Stuart Alyesworth (obs)	Gen-Tec Seeds		(519) 975-2557 gentec@on.acba.com
John Alyesworth (obs)	Gen-Tec Seeds		(519) 975-2557
Mike Wood (obs)	Norvartis Seeds Inc. Nampa Idaho		(208) 465-8533 mike.wood@seeds.novartis.com
Diana Yanik (obs)	H.J. Heinz Co. Ltd	H.J. Heinz Co Ltd Erie St, South, Leamington, Ont. N8H 3W8	(519) 322-4024/322-4104

Research Planning and Assessment Sub-committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Bob Roy	AAFC/SCPFRC-Delhi	Box 186, Delhi, ON. N4B 2W9	(519) 582-1950/582-4223 royr@em.agr.ca
Chris Gillard, Secretary	Ridgetown College, U of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-1632/674-1600 cgillard @ridgetownc.uoguelph.ca
Brian Hall	OMAFRA	Stratford Resource Centre, 581 Huron St. Stratford, ON. N5A 5T8	(519) 271-0083/273-5278 brian.hall@omafra.gov.on.ca
Tino Breuer	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566
Tom Smith	Plant Ag. U of Guelph	Plant Agriculture Department, Univ. Of Guelph, Guelph, ON N1G	(519) 824-4120(ext8339)

		2W1	tsmith@plant.uoguelph.ca
Tom Michaels	Plant Ag. U of Guelph	Plant Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120 tmichaels@crop.uoguelph.ca
Soon Park	AAFC -Harrow	Harrow Research Centre Harrow, Ont. N0r 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Garnet Wright	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	fax: 519-482-3940
Allan Patterson	Patterson Grain		(519) 461-1829/461-0879
Bruce Cruikshank	OCBGA	R.R.#2 Paris	grbean@bis.on.ca
Jeff Ferguson	OBDA	R.R. # 6, St Thomas, Ontario	(519) 631-3463/631-8843
John Van Herk Jr.	CPBC CSTA	Hyland Seeds P.O. Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146/ 676-5674 Jvanherk@wgthompson.com
John Thomson	OWBP	4206 Raney Cres. London Ont. N6L 1C3	(519) 263-3034 (phone & fax)
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455/527-0787
Jeff Allan	OSGA	R.R.#1 Brucefield	33-9846 allan@toc.on.ca
Art Schaafsma	Ridgetown College, U. of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-5456/674-3504
Peter Sikkema	Ridgetown College, U. of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	
Lorna Woodrow	AAFC Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 738-2251
Kangfu Yu	AAFC Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	38-2251
John Madill	Kemptville College	Kemptville College U of Guelph Kemptville, Ont, K0G 1J0	(613) 258-8444/258-8384
Bob Hall	Environmental Biology U. Of Guelph	University of Guelph Guelph, Ont, N1G 2W1	(519) 824-4120/837-0442 rhall@evhort.uoguelph.ca

MEMBERS OF THE
ONTARIO TOBACCO COMMITTEE AND ITS SUBCOMMITTEES
FOR 2001

Ontario Tobacco Committee (main committee)

M. Haji
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

Dan Van Hooren
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 271
Fax: (519) 582-4504

G. Amankwa
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 282
Fax: (519) 582-4504

Dan Ramer
Ontario Ministry of Agriculture, Food
and Rural Affairs
P.O. Box 186
Delhi, Ontario, N4B 2W9
Phone: (519) 582-1956
Fax: (519) 582-4504

Ron Brammall
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

2001 membership of the Ontario Tobacco Production Practices Sub-committee

D.L. VanHooren
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 271
Fax: (519) 582-4504

Denise Beaton
Ontario Ministry of Agriculture, Food
and Rural Affairs
P.O. Box 186
Delhi, Ontario, N4B 2W9
Phone: (519) 582-1956
Fax: (519) 582-4504

Dr. H.M.Haji
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

Bruce Abbey
Crop Protection Institute
C/O Aventis Crop Science
89 Normandy Inc.
London, Ontario N6H 4B1
Phone: (519) 471-5128

Dr. Godfried Amankwa
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 282
Fax: (519) 582-4504

Brian Smeeton
RJ Reynolds
P.O. Box 129
Nerry Hill, North Carolina
USA 27957

Willy VanHeugten
Ontario Flue-Cured Tobacco Growers'
Marketing Board
P.O. Box 70
Tillsonburg, Ontario, N4G 4H4
Phone: (519) 842-3661
Fax: (519) 842-7813

Marcel Anseeuw
Ontario Flue-Cured Tobacco Growers'
Marketing Board
P.O. Box 70
Tillsonburg, Ontario, N4G 4H4
Phone: (519) 842-3661
Fax: (519) 842-7813

Gaetan Duplessis
Imperial Tobacco Ltd.
3810, rue St-Antoine St.
Montreal, Quebec, H4C 1B5
Phone: (514) 932-6161
Fax: (514) 934-5928

Al Ratavicius
Imperial Tobacco Leaf Inc
P.O. Box 10, 516 John St. N.
Aylmer, Ontario N5H 2R8
Phone: (519) 773-9251, ext. 5200
Fax: (519) 765-2440

Randy Corneillie
JTI-Macdonald Inc.
P.O. Box 310, No. 3 Highway West
Tillsonburg, Ontario N4G 4H8
Phone: (519) 688-4125
Fax: (519) 688-0148

Steve Chapman
Rothmans, Benson & Hedges Inc.
64 Samor Road
Toronto, Ontario, M6A 1J7

Phone: (252) 482-0403
Fax: (252) 482-8622

Lori Long
Rothmans, Benson & Hedges Inc.
P.O. Box 101
Tillsonburg, Ontario
N4G 4H5
Phone: (519) 842-6431
Fax: (519) 842-4313

Dan Ramer
Ontario Ministry of Agriculture, Food
and Rural Affairs
P.O. Box 186
Delhi, Ontario, N4B 2W9
Phone: (519) 582-1956
Fax: (519) 582-4504

Rick DeCoutere
Imperial Tobacco Leaf Inc.
P.O. Box 10, 516 John St. N
Aylmer, Ontario N5H 2R8
Phone: (519) 773-9251, ext. 5200
Fax: (519) 765-2440

Phone: (416) 789-6013
Fax: (416) 789-3180

Dave R.E. Thomas
64 Samor Road
Toronto, Ontario, M6A 1J7
Phone: (416) 789-6013
Fax: (416) 789-3180

Ron Brammall
'anadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

Ron Brammall
'anadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

Ontario Flue-Cured Tobacco Variety Sub-committee

H.M. Haji, Chair
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario,
N4B 2W8
Phone: (519) 582-1950, ext. 257
Fax: (519) 582-4504

Dan Van Hooren
Canadian Tobacco Research Foundation
P.O. Box 1
Delhi, Ontario, N4B 2W8
Phone: (519) 582-1950, ext. 271
Fax: (519) 582-4504

Denise Beaton
Ontario Ministry of Agriculture, Food and Rural Affairs
P.O. Box 186
Delhi, Ontario, N4B 2W9
Phone: (519) 582-1956
Fax: (519) 582-4504

3- As Designated
Ontario Flue-Cured Tobacco Growers' Marketing Board
P.O. Box 70
Tillsonburg, Ontario, N4G 4H4
Phone: (519) 842-3661
Fax: (519) 842-7813

1-As Designated
Imperial Tobacco Ltd.
3810, rue St-Antoine St.
Montreal, Quebec, H4C 1B5
Phone: (514) 932-6161
Fax: (514) 934-5928

1-As Designated
RJR-Macdonald Inc.
2455 Ontario Street East
Montreal, Quebec, H2K 1W3
Phone: (514) 598-2525
Fax: (514) 598-0897

1-As Designated
Rothmans, Benson & Hedges
64 Samor Road
North York, Ontario, M6A 1J7
Phone: (416) 789-7711
Fax: (416) 789-2386

2-As Designated
Tobacco Exporters Association
c/o Simcoe Leaf Tobacco
P.O. Box 280
Simcoe, Ontario, N3Y 4L1
Phone: (519) 426-22-1
Fax: (519) 426-0474

1-As Designated
Canadian Tobacco Seed Producers

Ontario Forage Crop Committee

Membership:

ONTARIO FORAGE CROPS COMMITTEE
MEMBERSHIP OF CENTRAL AND SUB-COMMITTEES, 2001

Central Committee - eight members, four members nominated from each sub-committee

Mr. John Madill (P)	Chair (01-04) Kemptville College –UG
Mr. Joel Bagg (P)	Secretary (01-04) OMAFRA
Mr. Jim Johnston (P)	NLARS - UG
Mr. Bruce Whale (P)	OFC
Mr. Eric Bowman (V)	OSCIA
Mr. Jay Hackney (V)	Comm. Plant Breeders
Ms. Donna Hancock (V)	Plant Agr. UG
Mr. Chris Gillard (V)	Ridgetown College-UG

Production Sub-Committee

Mr. Jim Johnston	Chair 99-02 NLARS-UG
Mr. Joel Bagg	(Acting Chair 2001) OMAFRA
Mr. Jack Kyle	OMAFRA
Mr. John Madill	Secretary 01-04 Kemptville College-UG
Dr. E. Ann Clark	Crop Science, UG
Mr. John McGill	CSGA
Mr. Steve Mailloux	OSCIA
Mr. Bob Dippel	CSTA
Mr. John Gibson (alt)	CSTA
Dr. G. Roy	AAFC, Kapuskasing
Mr. Bruce Whale	OFC
Mr. Lloyd Kuhl	OCA
Mr. Jean-Guy Seguin	DFO
Ms. Wendy Asbil	Kemptville College-UG
TBA Ducks Unlimited	

Variety Sub-Committee

Ms. Donna Hancock	Chair 00-03 Plant Agric. UG
Mr. Jim Johnston	Secretary 01-04 NLARS-UG
Dr. Steve Bowley	Plant Agric., UG
Mr. Laurier Guillmette	AAFC Kapuskasing
Mr. Gordon Scheifele	Thunder Bay-UG
Mr. Chris Gillard	Ridgetown College-UG
Mr. John Madill	Kemptville College-UG
Mr. Joel Bagg	OMAFRA
Mr. Eric Bowman	OSCIA
Mr. John McGill	CSGA
Mr. Kevin Runnalls (alt)	CSGA

Mr. Tim Welbanks	CSTA
Mr. Jay Hackney	Commercial Plant Breeders
Mr. Barton MacLean	OFC
Mr. Matt. Bowman (alt)	NLARS-UG
Ms. Sher Bushell (observer)	Variety Reg'n, CFIA

ONTARIO FORAGE CROPS COMMITTEE
MEMBERSHIP OF CENTRAL AND SUB-COMMITTEES, 2001

OFCC Central Committee Membership- 2001	
Mr. John Madill, Chair 1999-2001 Kemptville College, U of Guelph Kemptville, ON K0G 1J0 Ph: (613) 258-8336 Fax:613-258-8401 jemadill@magi.com	Joel Bagg, - Secretary 2001-2003 OMAFRA 322 Kent St. W. Lindsay, ON K9V 4T7 Ph:(705) 324-6125 Fx:(705) 324-1638 jbagg@omafra.gov.on.ca
Mr. Eric Bowman, tario Soil and Crop Improvement Assoc. 1721 Reg. Rd. 3, Enniskillen, ON L0B 1J0 Ph:905-263-8245 ebowman@idirect.com	Mr. Jim Johnston ew Liskeard Agr. Res. Stn., U. of Guelph Box 6007, New Liskeard, P0J 1P0 Ph: (705) 647-8525 Fx: (705) 647-9220 jimjohn@onlink.net
Jay Hackney - Commercial Plant Breeders Rep. eed Canada Inc. ,1 Greenfield Rd. Lindsay, ON K9V 4S3 Ph: (705) 8789240 Fx: (705) 878-9249 jhackney@pickseed.com	Ms. Donna Hancock, U. of Guelph Dept. Plant Agr., Crop Sci. Bldg. Guelph, ON N1G 2W1 (519) 824-4120 x.8309 Fx: dhancock@plant.uoguelph.ca
Mr. Chris Gillard, Ridgetown College Ridgetown, ON N0P 2C0 Ph: (519) 674-1632 cgillard@ridgetownc.uoguelph.ca	r. Bruce Whale, Ontario Forage Council Clovermead Farms R.R.# 2, Alma, ON N0B 1A0 Ph: (519) 638-2230 Fx: (519) 638-5638 whale@wcl.on.ca

OFCC Production SubCommittee Membership 2001

Mr. Jim Johnston - Chair 2000-2002 w Liskeard Agr. Res. Stn., U. of Guelph Box G, New Liskeard, P0J 1P0 Ph: (705) 647-8525 Fx: (705) 647-9220 jimjohn@onlink.net	Mr. John Madill, Secretary 2002-2004 Kemptville College, U of Guelph Kemptville, ON K0G 1J0 Ph: (613) 258-8336 Fax: 613-258-8401 jemadill@magi.com
Dr. E. Ann Clark, U. Of Guelph Dept. Plant Agr., Crop Sci. Bldg. Guelph, ON N1G 2W1 Ph: (519) 824-4120 ext.2508 annclark@plant.uoguelph.ca	Ir. Bruce Whale, Ontario Forage Council Clovermead Farms R.R.# 2, Alma,ON N0B 1A0 Ph: (519) 638-2230 Fx: (519) 638-5638 whale@wcl.on.ca
Mr. John McGill, Ontario Seed Growers Assoc., R.R. # 4, Pakenham, ON K0A 2X0 Ph: (613) 256-2193 Fx: (613) 256-2528	Steve Mailloux, ntario Soil and Crop Improvement Assoc. 100 Mailloux Rd., Walford, ON P0P 2E0 Ph: 705-844-2888
Bob Dippel, Canadian Seed Trade Assoc. Speare Seeds, Box 171, Harristion, ON Ph: (519) 338-3840 Fx: (519) 338-2510 spearese@wcl.on.ca	Mr. John Gibson, Canadian Seed Trade Association (alternate) Growmark Inc. Box 634, Mississauga, ON L5M 2C1 Ph: 905-890-8500 Fx: 905-890-4383
Mr. Joel Bagg, OMAFRA 322 Kent St. W. Lindsay, ON K9V 4T7 Ph:(705) 324-6125 Fx:(705) 324-1638 jbagg@omafra.gov.on.ca	Dr. Gabriel Roy, AAFC Kapuskasing Experimental Farm, Box 160, Kapuskasing, ON P5N 2Y3 Ph:(705) 335-6148 Fx: (705) 337-6000
Mr. Jean-Guy Seguin, Dairy Farmers of Ontario R.R.#1, Verner, ON P0H 2M0 Ph: (705) 594-9058	Mr. Lloyd Kuhl, Ontario Cattlemens Association R.R. # 2, Desboro, ON N0H 1K0 Ph:(519) 794-3081 lkuhl@bmts.com
Ms. Wendy Asbill, Kemptville College, U. of Guelph Kemptville, ON K0G 1J0 Ph: 613-258-8336 wasbill@kemptvillec.uoguelph.ca	Mr. Jack Kyle OMAFRA 322 Kent St. W. Lindsay, ON K9V 4T7 Ph:(705) 324-6125 Fx:(705) 324-1638 jbagg@omafra.gov.on.ca
To be announced - wildlife habitat rep.	

OFCC Variety Subcommittee Membership 2001	
Ms. Donna Hancock, Chair, 2001-2003 Dept. Plant Agric., Crop Sci. Bldg. U. of Guelph, Guelph, ON N1G 2W1	Mr. Jim Johnston: Secretary 01 - 04 ew Liskeard Agr. Res. Stn., U. of Guelph Box 6007, New Liskeard, P0J 1P0

Ph: (519) 824-4120 Fx: (519) 763-8933 dhancock@plant.uoguelph.ca	Ph: (705) 647-8525 Fx: (705) 647-9220 jimjohn@onlink.net
Dr. Steve Bowley, Dept. Plant Agric., Crop Sci. Bldg. U of Guelph, Guelph, ON N1G 2W1 Ph: (519) 824-4120 Fx: (519) 763-8933 sbowley@plant.uoguelph.ca	Mr. Laurier Guillemette, AAFC Kapuskasing Experimental Farm, Box 160, Kapuskasing, ON P5N 2Y3 Ph: (705) 335-6148 Fx: (705) 337-6000 laurierg@ntl.sympatico.ca
Mr. Gordon Scheifele, hunder Bay Research Stn. U. of Guelph, 5 Euclid Ave. Thunder Bay, ON P7A 6G6 Ph: (807) 475-1373 Fx: 807-475-1219 gscheife@omafra.gov.on.ca	Mr. Chris Gillard, Ridgetown College Ridgetown, ON N0P 2C0 Ph: (519) 674-1632 cgillard@ridgetownc.uoguelph.ca
Mr. John Madill, Kemptville College, U. of Guelph Kemptville, ON K0G 1J0 Ph: (613) 258-8336 Fx: 613-258-8401 jemadill@magi.com	Mr. Joel Bagg, OMAFRA 322 Kent St. W. Lindsay, ON K9V 4T7 Ph:(705) 324-6125 Fx:(705) 324-1638 jbagg@omafra.gov.on.ca
Mr. Eric Bowman, rio Soil and Crop Improvement Assoc. 1721 Reg. Rd. 3, Enniskillen, ON L0B 1J0 Ph: 905-263-8245 ebowman@idirect.com	Mr. John McGill, Ontario Seed Growers Assoc., R.R. # 4, Pakenham, ON K0A 2X0 Ph: (613) 256-2193 Fx: (613) 256-2528
r. Kevin Runnals, Ontario Seed Growers Association - Alternate R. R. # 1, Thornloe, ON P0J 1S0 Ph: (7050 563 - 2496 kevrun@nt.net	Jay Hackney - Commercial Plant Breeders Rep. Pickseed Canada Inc. 1 Greenfield Rd. Lindsay, ON K9V 4S3 Ph: (705) 8789240 Fx: (705) 878-9249 jhackney@pickseed.com
Ir. Tim Welbanks, Canadian Seed Trade Association - Alternate Pioneer Hi-Bred Ltd. Box 730, Chatham, ON N7M 5L1 Ph:(800) 265-9435 Fx: (519) 436-6753 welbanks@phibred.com	Barton MacLean, Ontario Forage Council R. R. #1 Napanee, Ontario K7R 3K6 Phone (613) 354 2759 Fax (613) 354 1642 bmaclean@horizons.net
Ms. Sher Bushell, Observer Canadian Food Inspection Agency nt Products Division, Variety Registration 59 Camelot Dr., Nepean, ON K1A 0Y9 Ph: (613) 225-2342 Fx: (613) 228-6629 sbushell@inspection.gc.ca	

MEMBERS OF THE FIELD CROP SUBCOMMITTEE

February, 2001

NAME	ADDRESS & NUMBERS	
UNIVERSITY OF GUELPH		
Art Schaafsma	Ridgetown College University of Guelph Ridgetown, Ontario N0P 2C0 P - 519-674-1624 F - 519-674-1600 aschaafsma@ridgetownc.uoguelph.ca	(chair)
Greg Boland	University of Guelph 3234 Edmund C. Bovey Laboratory Building Guelph, Ontario N1G 2W1 P - 519-826-4120 ext 2755 F - gboland@uoguelph.ca	
Mark Sears	University of Guelph 1106 Edmund C. Bovey Administration Building Guelph, Ontario N1G 2W1 P - 519-826-4120 ext 3921 F - msears@evb.uoguelph.ca	
AGRICULTURE AND AGRI-FOOD CANADA		
Bruce Broadbent	Agriculture and Agri-Food Canada P - 519-457-1470 ext. 251 F - 519-457-3997 broadbentb@em.agr.ca	
Peter Mason	Agriculture and Agri-Food Canada P - 613-759-1908 F - masonp@em.agr.ca	
Paul Mailloux	Agriculture and Agri-Food Canada	
ONTARIO MINISTRY OF AGRICULTURE, FOOD AND RURAL AFFAIRS		
Tracey Baute	Entomology Program Lead, Field Crops OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1696 F - 519-674-1564 tracey.baute@omafra.gov.on.ca	
Adam Hayes	Soil Management Specialist, Field Crops OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1621 F - 519-674-1564 adam.hayes@omafra.gov.on.ca	

Albert Tentuta	Pathologist, Field Crops Program Lead OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1617 F - 519-674-1564 albert.tenuta@omafra.gov.on.ca	

Peter Johnson	Cereals Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-8180 F - 519-273-5278 peter.johnson@omafra.gov.on.ca	
Brian Hall	Alternate Production Systems Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-0083 F - 519-273-5278 brian.hall@omafra.gov.on.ca	
Horst Bohner	Soybean Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-5858 F - 519-273-5278 horst.bohner@omafra.gov.on.ca	
Brent Kennedy	Manager, Field Crops OMAFRA 3rd Floor S, 1 Stone Road West Guelph, Ontario N1G 4Y2 P - 519-826-3257 F - 519-826-3567 brent.kennedy@omafra.gov.on.ca	
Greg Stewart	Corn Industry Program Lead OMAFRA c/o University of Guelph Crop Science Bldg., Dept. of Plant Agriculture Guelph, Ontario N1G 2W1 P - 519-824-4120, ext. 4865 F - 519-763-8933 greg.stewart@omafra.gov.on.ca	
Hugh Martin	Organic Crop Production Program Lead OMAFRA 1st Floor NW, 1 Stone Road West Guelph, Ontairo N1G 4Y2 P - 519-826-4587 F - 519-826-4964 hugh.martin@omafra.gov.on.ca	
Ian McDonald	Applied Research Co-ordinator, Field Crops OMAFRA	

	c/o University of Guelph Crop Science Bldg., Dept. of Plant Agriculture Guelph, Ontario N1G 2W1 P - 519-8240-4120, ext. 6707 F - 519-763-8933 ian.mcdonald@omafra.gov.on.ca	
Jim Chaput	Minor Use Co-ordinator OMAFRA 1 Stone Road West, 3rd Floor Guelph, Ontario N1G 4Y2 P - 519-826-3539 F - 519 jim.chaput@omafra.gov.on.ca	

Kelly Ward	Product Development Specialist OMAFRA 1 Stone Road West, 3rd Floor Guelph, Ontario N1G 4Y2 P - 519-826-4094 F - 519- kelly.ward@omafra.gov.on.ca	
Gilles Quesnel	IPM Program Lead, Field Crops OMAFRA Box 2004, Concession Rd. Kemptville, Ontario K0G 1J0 P - 613-258-8250 F - 613-258-8392 gilles.quesnel@omafra.gov.on.ca	
Scott Banks	Emerging Crops Specialist OMAFRA Box 2004, Concession Rd. Kemptville, Ontario K0G 1J0 P - 613-258-8359 F - 613-258-8392 scott.banks@omafra.gov.on.ca	
Joel Bagg	Forage Specialist OMAFRA 322 Kent. St. West Lindsay, Ontario K9V 2Z9 P - 705-324-5856 F - 705-324-1638 joel.bagg@omafra.gov.on.ca	
ONTARIO MINISTRY OF THE ENVIRONMENT		
Doug Mewett	OMOE 135 St. Clair Ave. West, Suite 100 Toronto, Ontario M4V 1P5 P - 416-314-9235 F - 416-314-9237 doug.mewett@oeb.gov.on.ca	
COMMODITY ASSOCIATION MEMBERS		
Ken Hough	Ontario Corn Producers' Association 90 Woodlawn Rd. West Guelph, Ontario N1H 1B2 P - 519-837-1660	

	F - 519-837-1674 khough@ontariocorn.org	
Don McCabe	Ontario Corn Producers' Association R. R. # 1 Inwood, Ontario N0N 1K0 P - 519-844-2482 F - 519-844-2603 dmccabe@xcelco.on.ca	
Matt McLean	Ontario Soybean Growers' Marketing Board Box 1199 Chatham, Ontario N7M 5L8 P - 519-352-7730 F - 519-352-8983 mclean@soybean.on.ca	
Greg Devries	Ontario Soybean Growers' Marketing Board P - 519-683-4587 F - 519- gpdev@mnsi.net	
COMPANY REPRESENTATIVES		
Brian Woolley	Aventis CropScience Canada 578 Krug Street Kitchener, Ontario N2B 1L7 P - 905-854-4465 F - 905-854-4478 brian.woolley@aventis.com	
Wayne Barton	BASF Canada 9 Pamela Place Guelph, Ontario N1H 8C8 P - 519-637-3696 F - 519-637-3697 bartonw@basf.com	
Scott MacDonald	BASF Canada 9 Pamela Place Guelph, Ontario N1H 8C8 P - 519-824-2724 F - 519-824-5632 macdonsr@basf.com	
Luc Bourgeois	Bayer Inc. 23 Cedar St. Eden Mills, Ontario N0B 1P0 P - 519-856-2652 F - 519-856-9067 luc.bourgeois.b@bayer.com	
Leo Blydorp	Bayer Inc. 23 Cedar St. Eden Mills, Ontario N0B 1P0 P - 519-856-2652 F - 519-856-9067 leo.blydorp.b@bayer.com	
Nancy Desousa	Dow AgroSciences Canada Inc. 305 Consortium Court London, Ontario N6E 2S8 P - 519-681-0925	

	F - 519-681-4557 ndesousa@dow.com	
Al McFadden	Dow AgroSciences Canada Inc. 305 Consortium Court London, Ontario N6E 2S8 P - 519-681-0925 F - 519-681-4557 aggmcfadden@dow.com	
Rene Petroski	Dupont Canada Inc. Box 233 Streetsville Postal Station Mississauga, Ontario L5M 2J4 P - 905-821-5029 F - 905-821-5505	
Lesley Wright	Engage Agro Corp. 315 Woodlawn West Guelph, Ontario N1H 7K8 P - 519-826-7878 F - 519-826-7675 lpwright@attcanada.com	
Brenda Nailor	Engage Agro Corp. 315 Woodlawn West Guelph, Ontario N1H 7K8 P - 519-826-7878 F - 519-826-7675 brendanailor@engageagro.com	
Gabe Ferguson	Global Agricultural Business Enterprises Inc. 8192 Petrolia Line Alvinston, Ontario N0N 1A0 P - 519-847-5516 F - 519-847-5515 gabe@xcelco.on.ca	
John Gibson	Growmark Inc. 5600 Cancross Court Box 3020, Station A Mississauga, Ontario L5A 3A4 P - 905-826-0200 F - 905-814-4341 jgibson@growmark.com	
Tim Moyes	Gustafson Partnership 5-160 Research Lane Guelph, Ontario N1G 5B2 P - 519-767-3366 x 224 F - 519-767-9598 tmoyes@gustafson.com	
Edwin Pensaert	Gustafson Partnership #10-2712 37th Ave. N.E. Calgary, Alberta T1Y 5L3 P - 403-735-2505 F - pensaert@gustafson.com	

Louis Caron	Norac Concepts Inc. P. O. Box 62023 Orleans, Ontario K1C 7H8 P - 613-841-2907 F - 613-841-2908 lcaron@noraconcepts.com	
Harold Wright	Syngenta Crop Protection Canada Inc. 140 Research Lane Research Park, University of Guelph Guelph, Ontario N1G 4Z3 P - 519-836-5665 F - 519-823-0504 harold.wright@syngenta.com	
Wayne Bennett	Syngenta Crop Protection Canada Inc. 140 Research Lane Research Park, University of Guelph Guelph, Ontario N1G 4Z3 P - 519-836-5665 F - 519-823-0504 wayne.bennett@syngenta.com	
Jim Anderson	Syngenta Crop Protection Canada Inc. P - 519-878-7491 F - jim.m.anderson@syngenta.com	
Patty Turner	United Agri Products (UAP) 789 Donnybrook Drive, R. R. # 2 Dorchester, Ontario N0L 1G5 P - 1-800-265-4624 P - 519-268-8001 F - 519-268-8013 pturner@uap.ca	

Keith Lockhart	Uniroyal Chemical 440 Dorland Road Oakville, Ontario L6J 6B1 P - 416-616-8052 F - 905-845-0478 keith_lockhart@uniroyalchemical.com	
Richard Groen	Valent Biosciences Canada Ltd. 19 Wildan Dr., Box 19 Freelton, Ontario L0R 1K0 P - 905-659-0886 F - 905-659-0885 richard.groen@valent.com	